Telephony

VOL. XI. JUNE, 1906. No. 6

NATIONAL INTERSTATE CONVENTION

THE annual convention of the National-Interstate Telephone Association will be held at the Auditorium Hotel, Chicago, on June 26, 27 and 28, 1906. On June 25 the permanent committees and the executive council and advisory board will hold meetings, and the convention proper will open at 2 p. m., June 26, with an address of welcome by Hon. Edward F. Dunne, mayor of Chicago. E. H. Moulton, president of the Twin City Telephone Company of Minneapolis will respond to the mayor's address of welcome. The complete program of the four days' session, which is published herewith, will give delegates and visitors an idea of the work to be accomplished.

JAMES B. HOGE.

This promises to be the best attended, most enthusiastic and by all means the most important convention of Independent telephone men ever held. The preparations have been made on an elaborate scale, and all attending are promised an enjoyable and profitable time. Every state will be represented at the convention and a number of Canadian telephone men have signified their intention of coming to Chicago for the convention. In an open letter to the telephone trade the president of the association, Mr. James B. Hoge, says:

"You are all undoubtedly familiar with the work being done by the National-Interstate Telephone Association and realize the possibilities of such an organization, if properly supported, in advancing the cause of Independent telephony and furthering the interests of everyone connected with the movement.

"Since this office was opened last June in accordance with resolutions adopted at the Chicago convention, systematic efforts have been made to carry out the purposes of this association, as set forth in Article II of the constitution:

> To cement together in a firmer union all the Independent telephone interests of the United States for the purpose of: First, gathering information and statistics; second, promotion of development in territory not now developed and protection of existing interests; third, uniformity and standardization; and doing any and all other things that are to the best interests of the members of the association.

"As a result, the Independents of the entire country are now in closer touch with each other and realize to a greater extent their community of interests and the necessity for concerted action than ever before. Associations have been and are being formed in states hitherto unorganized and existing state and district organizations have been strengthened and perfected, so that the Independent telephone people today are working in greater harmony and are consequently in a better position to effectively resist the encroachments of their competitor, while developing their respective territories than at any time in their history. They have been induced to adopt a standard advertising sign, and the "Shield" is now being displayed throughout the country in place of the many designs formerly in use. Independent companies wherever located are thus receiving the benefit of general advertising in all parts of the country, and the public are being rapidly educated to the significance of the "Shield" as the emblem of Independent telephony and the extent and unity of the Independent system.

"During the last few months, through the columns of magazines, journals and the press, the Independent movement has been fairly presented to the general public, so that they are better informed regarding the true situation in the telephone field, and are consequently more in sympathy with the aims and purposes of the Independents and more inclined to lend them their aid and support, than at any time in the past. Very complete statistics for a number of states have been gathered, besides considerable valuable data of a general nature for the entire country. A drafting department has been established for the purpose of preparing maps showing the Independent toll line development of each state in the Union. Sixteen such state maps have already been started and a number of these are nearing completion.

"The association through the state and district organizations affiliated with the national body, is in a peculiarly advantageous position to assist and encourage the Independent interests in all parts of the field, and to secure the most complete statistics obtainable for their use. The results achieved show the possibilities in this direction. We plan to perfect arrangements for completing the toll line maps, gathering and compiling statistics and general information concerning the Independent movement in such form, that it can be promptly furnished whenever needed to assist in obtaining Independent franchise concessions, strengthening or expanding the movement at any place. Also to enlighten the people of any particular locality and the general public in regard to the true situation. To effectively accomplish this, we should establish a Publicity Department, which will carefully investigate and refute the false or misleading articles emanating from our competitor's news bureau, which are constantly appearing in the guise of "news articles" in the press of the country, and which when unchallenged, are

accepted by many unprejudiced readers as truth. Through our own Publicity Department we could present the facts of our side of the case, thus correcting the wrong impressions often created by such articles."

The following notice to delegates arranging to attend the convention has been sent out from the association headquarters:

Arrangements have been made with all railroads for reduced rates returning from the convention to all points from which one-way fare to Chicago is seventy-five cents or upwards, providing not less than 100 persons are in attendance who have complied with the following conditions:

Full fare, first-class, through tickets to Chicago must be purchased not earlier than June 21, nor later than June 27.

A standard form of certificate properly filled out and signed by the ticket agent must be secured at station where ticket is purchased. Agent issuing such certificate will request purchaser to sign same with ink in his presence.

If through tickets or certificates cannot be obtained at any station, agent will advise nearest junction point where same may be secured. Be sure to get a certificate. Agent's or conductor's receipts for fare paid cannot be accepted instead.

Upon arriving in Chicago, deposit certificates at the convention headquarters in the Auditorium Hotel with Mr. J. A. Harney, assistant secretary, for his endorsement. When 100 or more have been so deposited, they will be visaed by a special agent of the railroad who will be in attendance June 27 and 28 for this purpose, and who will collect a fee of twenty-five cents from persons presenting same for each certificate visaed. Holders of certificates leaving before his arrival or before 100 certificates have been deposited with the assistant secretary, or who present certificates after the special agent's departure, cannot take advantage of reduced rates under this plan.

Ticket agents at Chicago will sell return trip tickets to starting points at one-third of the regular first-class fare, to each holder of a properly endorsed and visaed certificate, providing such holder is the person to whom certificate was originally issued and whose signature appears on same. Neither certificate nor tickets secured under this arrangement are transferable, and for the purpose of identification, ticket agents at Chicago will request purchasers of return tickets to sign certificates in their presence. Tickets or certificates presented by unauthorized persons will be confiscated.

The association has guaranteed to redeem at regular tariff rates, all tickets secured under this plan which are misused or presented for sale.

The railroads request that all desiring to take advantage of the reduced rates, advise their respective ticket agents as far ahead as possible, so that through tickets and certificates may be prepared. They further request that same be called for not later than thirty minutes before departure of train, in order to avoid confusion at stations. If necessary, further particulars can be obtained from local ticket agents.

Please note the foregoing carefully. There will be several hundred people from all parts of the country attending the convention, but unless one hundred or more certificates are presented to the special agent, no reduction on any of them can be allowed, regardless of the number actually present. Everyone attending the convention is therefore urged to secure certificates and observe all other necessary conditions, so that the associations' plan for securing reduced rates may be successful.

PROGRAM OF THE

ANNUAL CONVENTION OF THE NATIONAL-INTERSTATE TELEPHONE ASSOCIATION

Auditorium Hotel, Chicago, June 25-28th.

JUNE 25.

Meeting of Permanent Committees, 10 a. m.

Meeting of Executive Council and Advisory Board, 1:30 p. m.

JUNE 26.

Convention called to order, 2 p. m.

Address of Welcome: Hon. Edward F. Dunne, Mayor of Chicago.

Response: E. H. Moulton, president Twin City Telephone Company, Minneapolis, Minn.

President's Annual Address: Jas. B. Hoge, president National-Interstate Telephone Association, Cleveland, Ohio.

Officer's Reports.

Appointment of Committees.

Question Box.

MORNING SESSION—JUNE 27.

Meeting called to order at 10 o'clock.

Report of Entertainment Committee.

Discussion of and Action by the Convention.

Roll Call of States.

Paper: *Official Organs—National and States,* Chas. S. Norton, secretary Indiana Independent Telephone Association, Indianapolis, Indiana.

Discussion.

Paper: *Look for the Shield,* P. A. Walker, general manager Central Iowa Telephone Company, Iowa Falls, Iowa.

Discussion.

Paper: *Telephone Publicity—Appealing to Public Opinion,* Mr. Ivy L. Lee, New York, N. Y.

AFTERNOON SESSION—JUNE 27.

Meeting called to order at 2 o'clock.

Report of Committee on Standard Forms of Accounting.

Discussion and Action.

Discussion.

Address: *The San Francisco Disaster,* Mr. John Van Liew, president California Independent Telephone Association, Oakland, California.

Report of Committee on Standardization of Equipment.

Discussion and Action.

Address: *Southern Toll Lines and Exchange Development,* A Representative from the Southern States.

Question Box.

Informal Banquet, 8:30 p. m. Col. J. D. Powers, Louisville, Kentucky, Toastmaster.

Speakers announced later.

MORNING SESSION—JUNE 28.

Meeting called to order at 10 o'clock.

Report of Committee on Standard Operating Rules and Regulation.

Discussion and Action.

Paper: Suggesting *How to Finance Small Telephone Properties,* Theodore Gary, vice-president National-Interstate Telephone Association, Macon, Missouri.

Discussion.

Reports of Outstanding Committees.

Discussion and Action.

Presentation of New Business.

Question Box.

AFTERNOON SESSION—JUNE 28.

Meeting called to order at 1:30 o'clock.

Transaction of Unfinished Business.

Report of Nomination Committee.

Election of Officers.

Installation of Officers.

Farewell Address (speaker announced later).

OFFICIAL BULLETIN NUMBER ELEVEN.

In Bulletin No. 11 the National-Interstate Telephone Association announces that the Independent toll line map of Ohio has been finished and is being published for distribution by subscription at the following prices, charges prepaid: One to ten copies, thirty cents each; ten to fifty copies, twenty-five cents each. It is recommended that subscriptions be sent in promptly as the edition will be limited.

At the request of a number of Independent companies the association has arranged to furnish inexpensive large cardboard "Shield" signs for use on construction work and bill boards. The use of the "Shield" is constantly spreading. Independent companies in thirty-eight states are now displaying the emblem.

The attention of telephone men is called to the annual convention at the Auditorium Hotel, Chicago, June 26-28. All indications point to a record-breaking meeting. The importance of the gathering insures a large attendance of representative Independent telephone men from all parts of the country and no efforts will be spared to make the occasion a memorable one. The convention will be called to order at 2 p. m. on June 26. Mayor Dunne of Chicago will deliver the address of welcome. The convention will adjourn at 5 p. m., June 28, thus giving all who desire to stay until the last an opportunity to take evening trains home.

An extremely interesting program has been arranged. There will be no lengthy "dissertations" or "sermons," but important matters of vital concern to every Independent in the field will be presented in brief, carefully prepared papers, or short, practical talks by men who are acknowledged masters of their subjects. All may share in the general discussions which follow.

The question box, a feature at each session, will afford an opportunity for anyone to introduce important subjects for consideration. There will not be a dry hour throughout the entire program.

An informal banquet will be held in the Auditorium Hotel on June 27, at 8:30 p. m. Some of the best after-dinner speakers of the country will be present to respond to toasts when called on by Col. J. D. Powers of Louisville, Ky., who has agreed to preside as toastmaster. All who know Col. Powers appreciate the treat in store for those attending the banquet. With a view of showing the substantial character of the Independent movement and the general prosperity of the companies comprising it, an exhibit of photographs of Independent plants has been arranged. To stimulate interest in this, there will be awarded first, second and third prizes of $15.00, $10.00 and $5.00, respectively, for the best photographs submitted. Every company is invited to participate in this contest. The awards will be made by a committee of Chicago photographers strictly on the merits of the photographs without regard to the size of building, so that all who take part, stand an equal show. All photographs will be displayed in the hall during the convention. Bring a photo of your building whether you care for a prize or not, and help the committee make a good display.

The manufacturers and supply dealers are co-operating with the association in making the convention a success. They have arranged splendid exhibits of the latest and best in telephone equipment and supplies, besides sundry programs for the diversion of telephone men between sessions. You will not be allowed to get lonely while in Chicago.

Think of the opportunities presented by a gathering like this convention. No where else could you meet such an up-to-date representative body of Independent telephone men from all sections of the country, with whom you can exchange experiences and ideas, to your mutual advantage, regarding the various aspects of the business in which you are all interested. Through the exhibits you may become familiar with the most modern apparatus manufactured, and through the program and discussions learn the latest and most improved methods of profitably conducting your business. In addition to this you get in touch with what is being done by your fellow Independents in all parts of the United States.

The progressive Independent telephone man who prides himself on being up-to-date, and who would keep abreast of the times, will certainly attend the convention.

To accommodate the large number who are arranging to come, reduced rates, under the certificate plan, have been secured on all railroads. We want everyone who attends to take advantage of these rates and help make our plan a success.

The association headquarters will be established at the Auditorium Hotel for the purpose of furnishing all necessary information and looking after the wants of visiting telephone men. It will also have a display in another part of the hotel of the various things handled by the supply department, besides the maps which have been prepared to date, by its drafting department.

IMPROVEMENTS IN COLOMBO TELEPHONE SYSTEM.

The following delightful extract is the work of a correspondent of the Ceylon Standard, says the London Electrical Review. It might be thought an excellent piece of humor, but we believe it is meant to be taken seriously: "At last the Colombo telephone service bids fair to become what telephones were intended to be, a real convenience to those using them. Walking along the new routes in the Fort and elsewhere, one cannot help noticing the improvements and up-to-date class of work done by the English foreman, Mr. Lovett. On some routes, wires are run on the twist—left twist. They are cut at every span. Pulled up quite taut and terminated on double-grooved [*sic*] insulators in ornamental style and the ends taken above the insulators and neatly twisted together, this joint requires no solder to ensure electrical contact. On other routes wires are run on bare wooden arms and tied round them where they terminate, thus doing away with the insulators which are only 'points' of leakage. Another advantage in this system is, that any number of wires could be put on a post, and all intending subscribers can be provided with immediate connections. It is further the safest method for wires erected over tramway wires having no glazed insulators from which wires could easily slip off. At subscriber's offices the india-rubber covered wires are run in a manner never before done. The pair of wires are neatly and firmly fixed along the wall, under one staple—and a large number of staples are used to prevent the wires hanging loose—and presenting an unsightly appearance. The same system is adopted in joining wires or cross arms. Stays are now fixed overhead. A short pole is planted on the opposite side of the pole, and a stranded wire runs from it at a beautiful gradient to the pole requiring support. The public can now walk or ride past telephone posts without fear of tripping against stays. I hope, ere long to see further improvements effected, and trust that those mentioned above will relieve the minds of some people, who do not believe that Colombo will ever have a perfect telephone system."

A SECRET WIRELESS TELEPHONE.

The secret wireless telephone of A. T. M. Johnson, a retired Australian official, depends upon steel reeds, tuned in unison or octave to the voice of the person speaking, and, as voices vary greatly, a special reed is necessary for each person. On speaking into the ordinary microphone, a large Rhumkorff coil in circuit transmits the vibrations, without connecting wire, to the receiving apparatus. Messages have been sent distances of half a mile. Secret telegrams can be sent through similar tuned steel reeds, and these are received by secret bell arranged to respond only to the vibrations from the proper transmitter.

A MODEL EXCHANGE

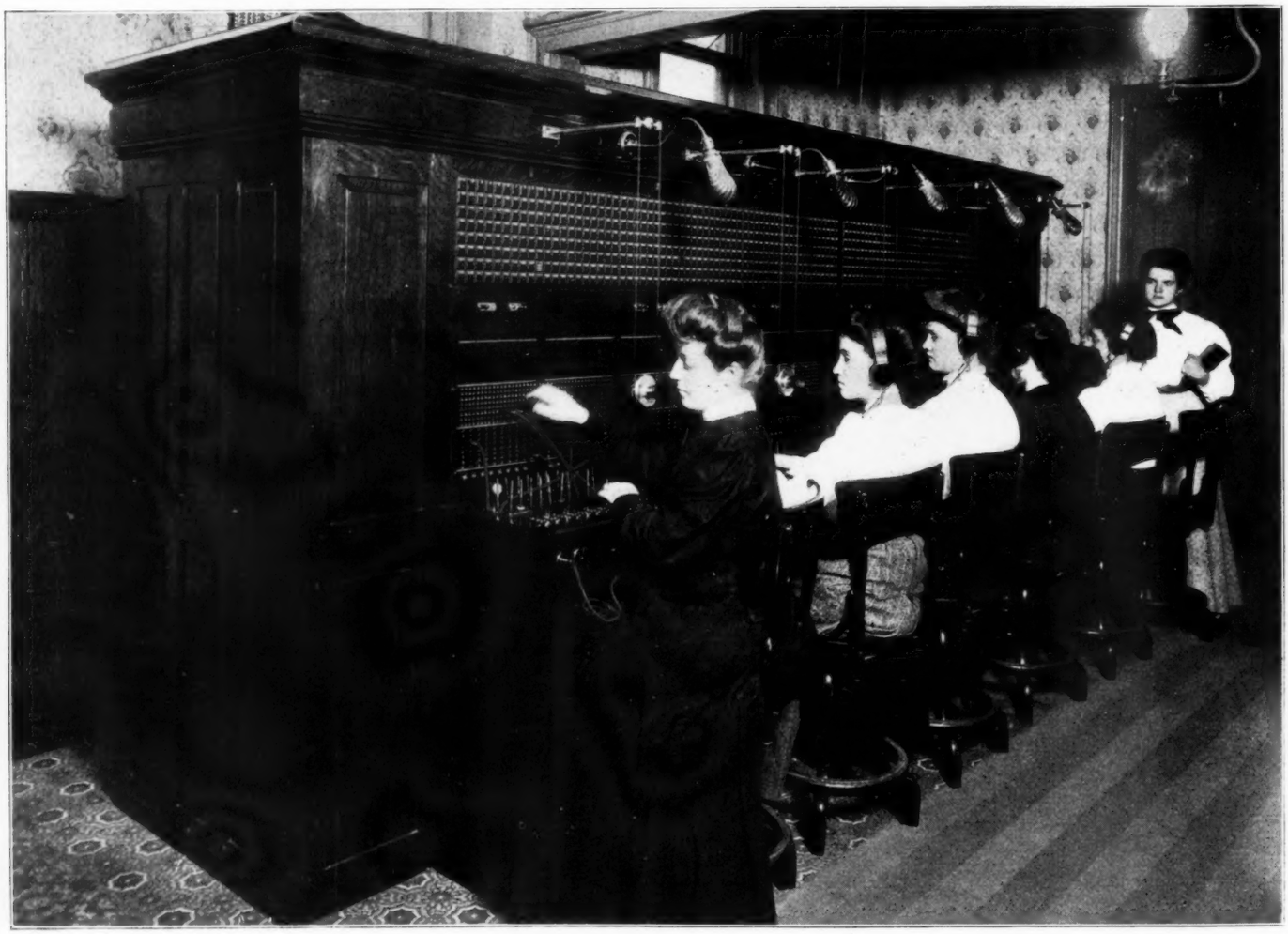
History of the Goshen Indiana Home Telephone Company

By Earl C. Long

THE Home Telephone Company of Goshen, Indiana, has a history which is typical of the development of Independent telephony. The first telephone exchange in the town opened for business about seventeen years ago. The population was then about half what it is now. The Bell company made the start and charged $3.00 per month for residence and $4.00 for business telephones. At that time the company was justly entitled to compensation for patent rights; and the rate was not considered exorbitant. At these rates, an exchange of about 100 subscribers was operated for a number of years, till the legislature fixed a limit of rates at $2.00 and $3.00 per month for towns of the size of Goshen. Rather than obey the law the Bell company removed its telephones from town and closed its offices not only in Goshen, but in most all other towns in the state. Goshen was then without telephone service for a year or more.

Relief was then offered by the Cushman Telephone Company which erected a plant and furnished very good service at statutory rates until driven from the field by vexatious patent litigation by the Bell company. Then came another short period of "no telephone service"; but finally this inconvenience became so burdensome that a limited number of business men swallowed the bitter dose and let the Bell company come back at the old rate of $3.00 and $4.00, simply because there was no other telephone service to be had at any price, the Bell company still holding the key to the situation by patent monopoly. These conditions prevailed till some time after the expiration of the Bell patents, when the business men of the city, through one of their organizations, appointed a committee to ascertain if it was not possible to secure better, cheaper and more extended telephone service for Goshen. It should be borne in mind, all the time, that while the population and business of Goshen had increased over 100 per cent, the telephone patrons and accommodations had not grown over 10 per cent in the same time.

The business men's committee had little or no thought of starting or encouraging an Independent telephone move-



Two Thousand Capacity Chicago Telephone Supply Company's Visual Signal Target Type Switchboard.

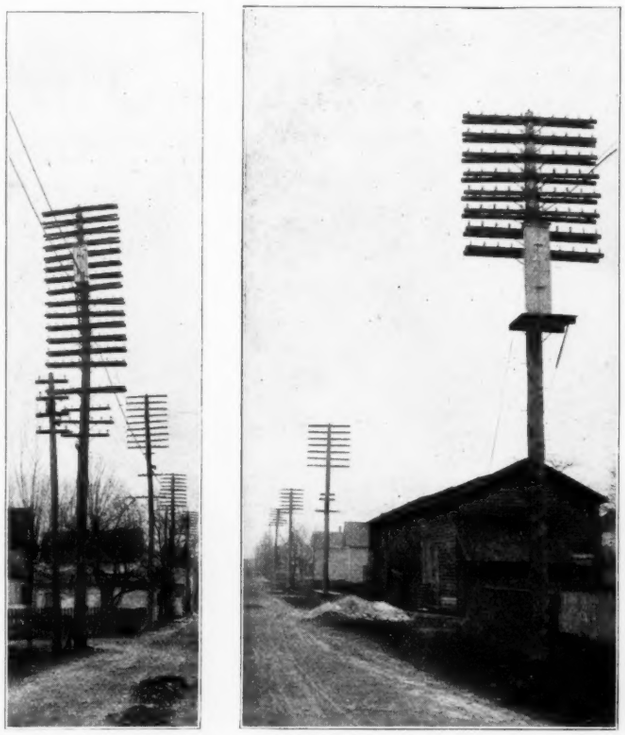
ment. They supposed they could have a conference with the old company and explain why a cheaper rate and a larger list of subscribers would be mutually beneficial to all concerned, on the same principle that a reduction of postage rates with increased facilities does not deplete the revenue, but greatly benefits the masses. These overtures from this committee were treated in an uncivil manner by the state officers of the Bell company. Their answer, in substance, was that they were running the telephone business and whenever they wanted suggestions or advice from Goshen they would call for it.

The Bell company's treatment of the Citizen's committee left them but one alternative, that was to solve the problem through an Independent plant. This step was taken with reluctance, because of inexperience and the uncertainties regarding reliable apparatus that was free from patent infringement. But the public demands and assurances won the day, and work on the new plant was begun in April, 1897. On this date the Bell company had about one hundred subscribers, after fourteen years of operation, at its rate of $36.00 per year for residences and $48.00 per year for business places, within one mile of its central office. By June, 1897, most of the new company's poles had been placed in position and some wire strung. On this date the Bell rates dropped from $36.00 and $48.00 to $24.00 and $36.00. Repentance came too late and the work on the home plant progressed, but not without the trials and tribulations incident to inexperience.

Messrs. Teters and Hostetter were the promoters and builders of the new plant and by October 1, 1897, they had standing in the streets and alleys of Goshen probably the best constructed outside telephone plant in the state, but they had neither telephones nor switchboard, nor did they know where nor how to get them, owing to the failure of the company with which they had contracted. But the Bell company was probably not then aware of their desperation and lack of ammunition, because on that date it cut its residence rates to seventy-five cents and business rates to $1.00 per month. This proved a great blessing in disguise to the new company, because it reassured the people on the question of patent litigation. It was evident if the Bell company had a "sure thing" on patents, it would not voluntarily throw away its revenue in such a reckless fashion. Then, again, this desperate cut convinced everyone that it could not be good faith competition and that the people would suffer in the end if such tactics proved successful. All Bell officials now admit that this was bad generalship. Paying little attention to the Bell tactics the new company started in December, 1897, with the best apparatus that it could then purchase; but it was in no way comparable with that of the Bell. The old company was intrenched behind years of experience and had everything desirable, except the goodwill of the people.

The new company opened business with less than fifty subscribers, and in 1899 Messrs. Teters and Hostetter sold out to a corporation known as the Goshen Telephone Company and under the new management the exchange thrived and grew so rapidly that within one year 150 new subscribers were secured. In 1900 the organization was merged with others in the county under the name of the Home Telephone Company. At that time there were about 350 subscribers and the switchboard was of the express type with order wire transfer system.

The next five years saw the Goshen exchange become so important a factor in local affairs that the Bell exchange grew but little, if at all, while the Home company at the beginning of 1905 had 1,000 subscribers, counting the rural lines owned by it. It will readily be seen that a transfer board would be entirely too slow for such a system, so the plant was rebuilt and a new multiple switchboard purchased having visual signals and flash light supervision. The character of the new work is shown in the accompanying illustrations of several leads of line. The character of the new multiple switchboard, built by the Chicago Telephone Supply Company of Elkhart, Indiana, may be partially judged by the illustration in this article and the description which follows. The board was purchased and installed in 1905 and crowns the efforts of the management to give first-class service to patrons.



Showing Aerial Construction, Goshen, Ind.

The earnest work of a few men has made possible the growth and development of the Goshen exchange. To them belongs the credit of the result, because without such hard work, earnest purpose and affable manner in meeting the telephone public, no such results could have been secured. The present officers of the company are as follows: I W. Short, president; James A. Arthur, vice-president; H. B. Sykes, treasurer; Martin L. Crow, secretary and general manager; W. L. Shoots, local manager.

The following description of the switchboard may be found of interest to Independent telephone men.

It is of the Chicago visual signal target type, equipped for one thousand subscribers' lines, and consists of two sections, each of which is arranged for three operators' positions. The exposed woodwork of the front of the switchboard is of quarter-sawed white oak, with a golden oak finish. The subscribers' lines terminate at each operator's position in an answering jack and a visual signal target. The targets are mounted in the upper part of the cabinet above the multiple jacks, and the answering jacks in the lower part, directly beneath the multiple.

Answering jacks and targets are arranged 160 per operator. There is a multiple of each subscriber's line in each section so arranged that any operator, regardless of her location at the switchboard, can connect any one of the subscribers terminating at her position with any other subscriber's line connected to the switchboard.

Each operator is provided with fifteen pairs of cords and plugs, with their associated keys, relays and supervisory lamp signals. Each operator's equipment of targets is provided with a pilot signal which is operated when any target at the position is energized; it consists of a small incan-

descent lamp controlled by a relay and mounted behind a large white lens or cap. The purpose of this arrangement is to assist the operator in attending to her calls, and also to enable the chief operator to tell at a glance whether or not the operators are answering their calls promptly. There is also a similar pilot signal for each operator's equipment of cords which is displayed whenever a supervisory signal is operated. This signal is, however, mounted behind a red lens, and the chief operateor can easily tell whether or not the operators are properly supervising their various connections. The visual signal targets for the subscribers' lines are mounted in an iron frame work. They are so arranged that by simply removing two small screws they can be taken out of the switchboard in case of trouble, without unsoldering any connections. The current for operating the relays, lamp signals, operators' transmitters, etc., is supplied by a twelve cell storage battery. This battery is charged by a generator direct connected to a Wagner alternating current motor. There is also a power board of slate, upon which is mounted the ammeters, voltmeters, under and overload circuit breakers, switches, fuses, etc., for regulating and controlling the power equipment.

I. W. Short, President.

H. P. Sykes, Treasurer. M. L. Crow, General Manager. W. L. Shoots, Local Manager. J. A. Arthur, Vice President.
Officers and Directors The Home Telephone Company of Goshen, Ind.

The main distributing frame is of angle and bar iron construction. It is equipped with carbon lightning arresters and heat coils, which protect the switchboard apparatus against lightning and crosses with high tension circuits.

The subscribers' lines are brought into the exchange in lead covered cables, the wires of which are twisted in pairs (a pair for each subscriber's line), and insulated with dry paper. To the ends of these cables is spliced a twenty-foot length of a single lead covered cable, the wires of which are insulated with wool; the wool being moisture proof and non-inflammable, the danger of fire in the distributing frame is reduced to the minimum. This arrangement also allows the outside cables to be carried direct to the frame and fanned out to the terminal blocks without enclosing the ends of the paper cables in pot-heads filled with insulating compound. It is also easier to arrange the cables neatly and systematically. About three feet of the lead covering is removed from the wool cables and the exposed end is then immersed in hot beeswax which, when cool, holds the wool in place. It is also allowed to penetrate the cable underneath the sheath, which, in addition to the moisture proof qualities of the wool, aids in keeping dampness from getting into the paper cable.

The subscribers' lines from the switchboard terminate at the lightning arresters and protectors on the main frame. The wires between the switchboard and the main distributing frame are made up in cables of twenty pairs each. Each wire is insulated with two coverings of silk and one of cotton. The wires are arranged in pairs (a pair for each line), and each pair is twisted together for the purpose of eliminating cross talk. The cotton coverings of the pairs are of different colors, by means of which anyone of the wires can be identified without the necessity of testing it. The wires are held in the smallest possible space by a braided covering which encloses the twenty pairs. This also protects the wires from mechanical injury. The cables are carried upon a support of angle and bar iron which connects the switchboard and distributing board together. In the switchboard they are supported on an iron frame work where they are arranged in accordance with the multiple jacks to which they are connected. They are placed in groups of six and each group is separated from the other by means of a strip of non-elastic webbing. White and black webbing is used for this purpose in order that the various groups may be identified should it be necessary to clear any trouble in the jacks.

The entire equipment of the exchange is modern in every particular, as is the outside wire plant. The company has not been sparing in expense to give the telephone users of Goshen first-class service in every particular. The construction throughout the entire city has been put in with the intention of providing for the future growth of the system, so that it will not be necessary to rebuild, which is always more expensive than making provision in the original installation for the maximum number of subscribers.

Construction men who have inspected the construction work of the Goshen Home Telephone Company say that it compares favorably with the work installed in cities of much larger size, and is of a much higher grade than is found in the medium-sized exchanges. The present management is responsible for the splendid construction of the entire system, believing the best material should be used and the most substantial plant built in order to give the company's subscribers the highest grade of service. The wisdom of this course has been demonstrated by the constantly increasing list of subscribers and the staunch support given the company by the representative people of Goshen.

THE ACTRESS AND THE TELEPHONE.

Miss Blanche Ring is singing a new song called "At the Telephone" in "His Majesty," at the Majestic. Thereby hangs a tale, says the New York Mail. Owing to the illness of Nelson Roberts, the manager of the company, a telephone has been arranged for him near the electric stand in the first entrance that he may answer calls without leaving his chair. The other night the property telephone was missing, and the actor who carries it on was at loss till he dragged the stand nearer the entrance, and setting Roberts' instrument on it, instead of the usual "prop," left the comedienne to warble, all unconscious that she was using a live wire. Accordingly when she removed the receiver the girl answered just in time to catch the first words of the chorus—"Hello, give me ——Plaza." Central switched to the number requested, and as Miss Ring sang, "Hello, is that you, Louis?" she was startled by an icy feminine voice which responded, "No, madame, this is not Louis, please ring off!" For a moment the desire to laugh was almost overpowering, but realizing that the audience could hardly appreciate the fact that she was taking part in a duet rather than a solo, she continued bravely, while the answering voice grew louder as the verses flew over the wire.

CONCERNING CENTRAL OFFICE MAINTENANCE

By Samuel G. McMeen

THE subject under consideration in closing the last installment of this subject, was that of crosses between wires in the multiple, the apparatus recommended for assistance in testing for such crosses consisting merely of a telephone connected to a plug, so as to engage the short circuited wires, while a source of current—preferably a mild interrupted one—remained permanently bridged across the conductors leading from the receiver to the plug. Such an arrangement need not be bulky, and depends for

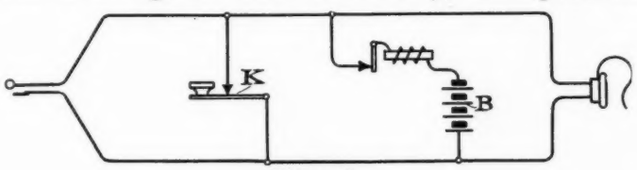


Figure 1.

its success on the principle of an ammeter in distinction to the principle of a voltmeter.

The circuits in question, with a slight addition for convenience, are shown in Figure 1, in which *B* is a buzzer in series with the battery, and *K* is a key adapted to short circuit the pair of wires. The latter is a mere convenience for the purpose of shutting out the sounds of the buzzer from the receiver except when they are desired, and in this way a closer discrimination can be made between the sound heard with the plug in one jack than that with it in another.

The method does not depend on a great refinement of perception by the ear, as it is usual that contact can be made with the crossed conductors within, at most, four feet.

The importance of this little point is evidenced by the fact that in Mr. Kelsey's department of questions and answers of the May issue, a correspondent asks him how to find crosses in multiple jacks without taking them out, or without unsoldering the wires from them here and there. Mr. Kelsey's answer is that a generator should be connected to the crossed wires at the distributing frame, a condenser being inserted in the circuit, and an audible tone thus impressed upon the crossed wires. Current will of course flow into the switchboard on one of the wires, through the cross thence back to the generator. A telephone receiver is connected to a switchboard plug in such a way that when inserted in a jack of the crossed line, the receiver will be bridged between the crossed conductors. At jacks nearer the beginning of the switchboard, the sound will be heard plainest, and as the listener moves away from the source of sound, a decline in the loudness of the tone will be noticed. At the point of the cross the sound will disappear, or at least reach a minimum. When the trouble is cleared, the hum of the generator will be heard equally at all points. Such a method is on the principle of the voltmeter method, and such an instrument may be used, if desired, in place of the telephone receiver.

Assuming a two wire multiple system, the arrangement shown in Figure 2 will be found serviceable. The battery *B* is connected through the resistence *R* to the wires which are crossed, and the voltmeter *V* to the terminals of a switchboard plug. Testing progressively from Jack 1, along the switchboard, the deflection of the voltmeter will be found to grow smaller as the cross is approached. But as the cabling of the switchboard is rarely of wire smaller than No. 22, Brown and Sharpe guage, the shunt formed by the cable conductors and the cross always will be a heavy one, relative to the resistance of the voltmeter coil. It is necessary, therefore, that the voltmeter be sensitive, giving a noticeable deflection on a small part of one volt. If there is at hand an ammeter having a separate shunt, the meter portion, without the shunt, will be quite suitable for this test. Inasmuch as most ammeters are mere low reading voltmeters, adapted to observe the voltage across a low resistance

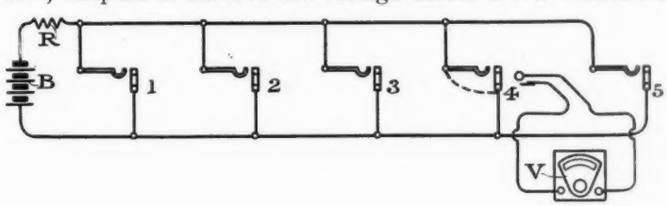


Figure 2.

over which current is passed, such a meter without its shunt is well adapted to this purpose, because the wires under test form the shunt, and the meter tests the voltage drop across successive portions of the shunt.

Either of the three mentioned methods will serve to enable one to locate a cross in the multiple, unless it be of high resistance. Ordinarily it is not necessary to locate with great exactness as to position, because, as has been said, the most likely position of the cross is at the point where conductors are brought out of the cables and soldered onto the jacks. Yet as a means of practicing on an important and useful phase of fault location, it may sometimes be interesting and useful to use a Varley loop test, applied by means of a galvanometer, bridge and rheostat.

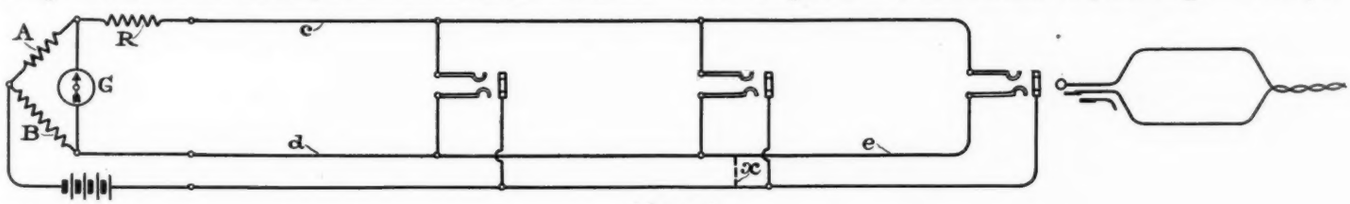


Figure 3.

This method is a suitable one for locating grounds or crosses in underground and aerial cables, and on long open wire lines. When used with its reversed form and in conjunction with the Murray loop method, it serves a very useful purpose in this work. An occasional application of the method to the location of a cross in a three-wire multiple switchboard serves not only to locate the particular trouble, but to fix the principle in one's mind. It is therefore given space here.

In Figure 3 it is assumed that the wires of the line in trouble are all of the same size, which may be taken to be universally true in switchboard cabling. The wires *c*, *d* and *f*,

are respectively the two line wires and the test wire, *c* and *e* being connected together at the last jack by a plug inserted therein. A cross is assumed to exist between one line wire and the test wire. This point is indicated by the dotted line at *X*. The conductor marked *c* indicates all of one line wire, while the other is composed of the portions *d* and *e*. The designation of the second line wire is divided into two parts for the reason that the object of the test is to determine how many feet from the distributing frame the cross may be found.

The portions *A* and *B* are the two arms of the Wheatstone bridge proper, and for this test *A* should be many times as great as *B*, because the resistance of the wires under test is very low, due to their short length. A convenient ratio is 100 to 1, for which purpose *A* may be made 1,000 and *B* 10 ohms.

The resistance *R* is the adjustable rheostat of the testing set, and the method of procedure is to connect the devices as shown, then to adjust the resistance *R* until a value is found when opening and closing the galvanometer battery circuits will not cause a deflectionof the galvanometer needle in either direction.

When this balance is reached, the resistance in *R* is to be noted, together with the resistance in each of the bridge arms; all but one of the necessary quantities are now determined.

The remaining element is the loop resistance of the two line wires; that is, the combined series resistance of the wires *c*, *d* and *e*. This is determinable by rearranging the bridge connections so as to measure resistance directly, and while keeping the plug in the last jack of the multiple, to measure merely upon the terminals of the wires *c* and *d*. This resistance being termed *L*, the facts of the two tests may be turned into the desired result by applying the following simple formula of the Varley test:

$$d = \frac{AL - BR}{A + B}$$

That is, to determine the resistance in ohms from the point of test to the point of the cross, *multiply the resistance of the arm A by the resistance of the line loop; subtract from this the product of the arm B and the rheostat resistance of the first test; divide the remainder by the sum of the arms A and B.*

Applying this to an actual case, assume that the switchboard is composed of ten sections, each somewhat under six feet in length, requiring each conductor from jack to jack to be eight feet long. Assume that the cables are formed of No. 22 B. & S. gauge wire; that the bridge arm *A* is 1,000 ohms and that the arm *B* is 10 ohms; that in the Varley test a balance was reached when the resistance *R* equaled 306 ohms, and that the loop resistance *L* in the second test was found to be 3.181 ohms. By the formula, then, the value of *d* is 1.1 ohms.

But it is not sufficient for us to know that the resistance is merely so many ohms, as the location of the cross is desired to be known in feet.

This distance can be determined in either of two ways. The resistance of No. 22 B. & S. wire is given in tables is .01641 ohm per foot, and 1.1 divided by this amount gives the distance as sixty-seven feet. Assuming the cable from the point of test to the first jack to be twenty-five feet, the cross is forty-two feet from the first jack, or a little more than five lengths of cable from that jack. The second method of turning the resistance into feet is to determine the resistance per foot directly from the loop resistance. In the assumed case of ten sections of switchboard with eight foot spans between jacks, and twenty-five feet to the main frame, the loop is one hundred and ninety-four feet long. Dividing the loop resistance by this length will give a value in ohms per foot, which can be used in converting the fault resistance into fault location.

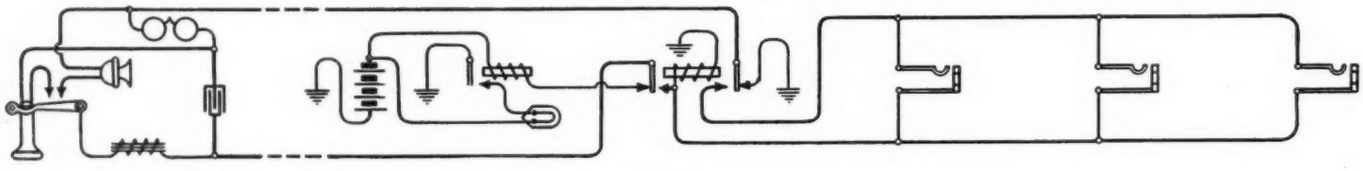


Figure 4.

Both of the systems of central office circuits described in the last issue involved the use of two line conductors and a separate test wire. In both, it will be recalled, this third wire was led through a cut-off relay to the main battery. One of the described cord circuits involved but two conductors in cords and plugs, while the other involved three.

Figure 4 displays the familiar line circuit of the Kellogg company, involving only two conductors throughout the multiple. These serve both the purposes of line conductors and test conductor. As in the two systems last described, the sleeve conductor leads through a cut-off relay to one battery terminal, shown in this sketch as ground. The arrangement of the line relay and its associated lamp are similar to the conditions in other systems, but the Kellogg arrangement is unique in that both sides of the line are actually cut off from the switchboard during all times when no plug is in one of its jacks. The arrangement really contains all the usual elements of a cut-off relay for each line, with the addition of the function of cutting the line through to the switchboard at the same time that it is cut off from the line relay and line signal apparatus.

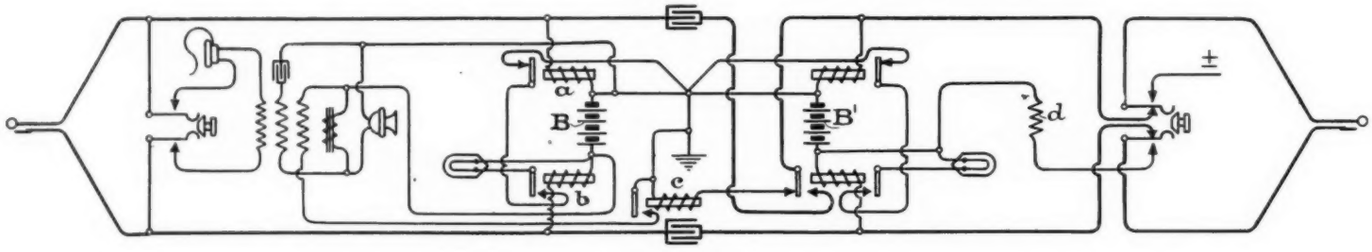


Figure 5.

The cord circuit of Figure 5 is that which co-operates in the Kellogg system with the line circuit of Figure 4. Disregarding for the moment the operator's telephone set and all ringing devices, this cord circuit, like others, is a mere path from plug to plug through an inductive link, with means for furnishing talking current to the two connected telephones. The inductive link through which the continuous currents pass, as cord circuits generally go, is either a repeating coil with a battery somehow in series, or a con-

denser serially connected in each side of the talking pair.

In the Kellogg case, the condenser is the inductive element, and current is supplied to the subscriber through impedances, of which there are two for each half of the cord, making four in all. These, however, are more than mere impedances, which latter serve to furnish direct current, but to oppose the high frequency voice currents and force them through the condensers to the distant subscriber. They are relays co-operating with the supervisory signals, and this they may well be without detracting in any particular from their other two purposes of passing direct and opposing voice currents.

Considering the relays *a* and *b* connected with the answering half of the cord circuit, it will be seen that the relay *b*, when the answering plug is inserted, will carry current from the ungrounded terminal of the battery through the test side of the line, through and to the cut-off relay. The lower relay of the calling side of the cord operates in quite the same manner, although it performs another function to be described later.

As the relay *b* and the cut-off relay of the line circuit are both capable of being operated by such a current as will flow through them in series, the line relay will be detached from one side of the line, and the solid ground from the other, whenever either a calling or answering plug is inserted in any jack of that line. At the same time the two line conductors, clear of all else, will be connected to the two line wires through the multiple, and the line circuit proper will become a clean pair from the multiple to the subscriber.

The operation of the relay *b* closes the supervisory lamp circuit in one of the two places in which it can be open, and if it were closed in the other place, the supervisory lamp would glow. The other place in question is the back contact of the armature of the relay *a*. Current from the battery *B* will flow, if it can, through both these supervisory relays, the subscriber's line and his telephone if the latter's receiver is off the hook. If it is so, the contact at the relay *a* will be broken and the supervisory lamp will be dark; and conveniently enough, will be so because it is receiving no current; for that reason this cord circuit is most economical, consuming no current for supervisory lamps while the subscribers are in conversation.

The relations of the supervisory lamp to the supervisory relays on the calling side of the circuit are identical with those described for the answering side, but with the addition of another armature to the relay corresponding to *b*. This armature will be inert unless the calling plug is in a jack, and therefore the circuit from the tip of the calling plug will be seen to trace through the relay *c* to ground. This relay which controls the operator's test, has a light active grounded armature, capable, on closing, of passing an impulse through the test winding of the operator's telephone set, and so apprising her that the tip of her testing plug is finding a potential on the test ring. From what has been said above it will be seen that no potential can exist on the test side of the line unless given to it by current through one or the other supervisory relay like *b*.

When it is remembered that no connection between the switchboard jack and the subscriber's telephone, can exist in this system unless the cut-off relay is operated, the reason for the resistance *d* of Figure 5 will be apparent. If on operating the ringing key the supervisory relays and their current supply are disconnected from the cord circuit, and unless provision is made in some other way, the cut-off relay will fall, preventing ringing current from reaching the subscriber's telephone. The resistance *d* furnishes battery current to the side of the line which previously has received it through the suprvisory relay, while the other side of the line, controlled by the tip of the plug, furnishes ringing current. The cut-off relay will thus be held operated during the operation of the ringing key.

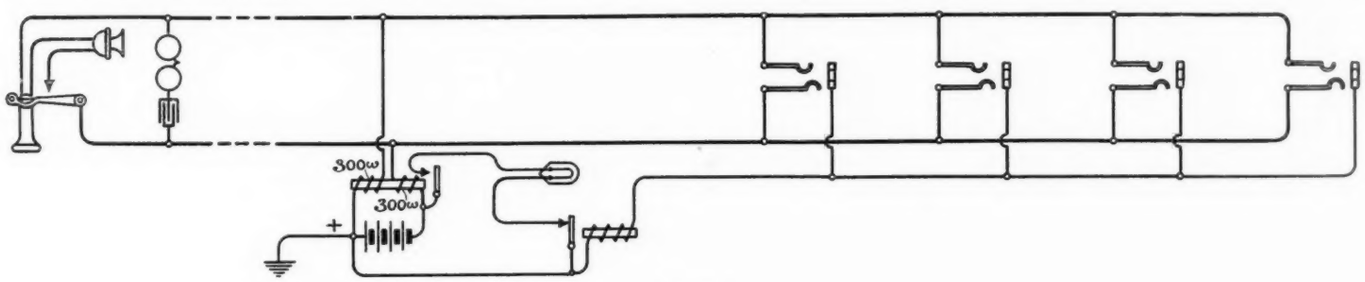


Figure 6.

In the strictest sense, the Kellogg line circuit is not a balanced one, unless the relays on the tip side of the line have such a relation to the cut-off relays that the impedance to ground from both side of the connected circuits is exactly the same. It is improbable that in actual manufacture this condition of balance is attained, and in conditions of severest exposure, and particularly in connections between long exposed toll lines and Kellogg local lines, it should be expected that conditions of improper balance would result in disturbing noises. Yet it is not impossible so to refine the elements as to reduce this disturbance to a minimum, and that ability must be weighed up against the advantages of combining the line and test circuits throughout the multiple.

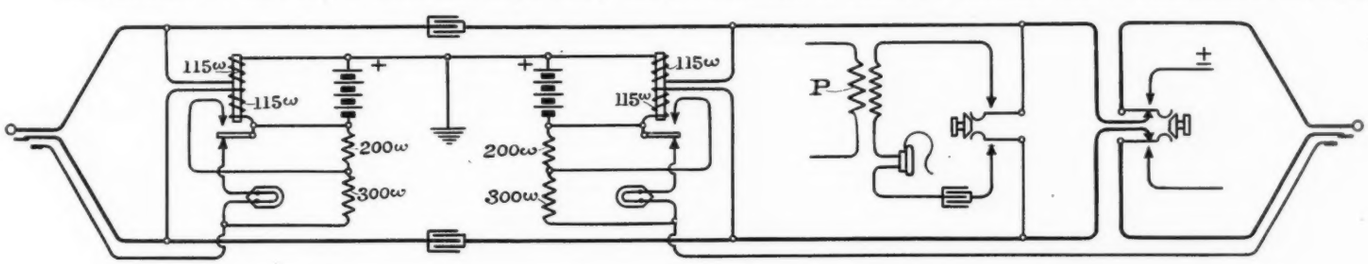


Figure 7.

The line and cord circuits of the North Electric company are illustrated in Figures 6 and 7. Figure 6, it will be seen, discloses a line circuit similar to the two systems described in the last issue, in which the talking conductors throughout the board are terminated in springs, with the advantages of close but yielding contacts, while the test circuit is carried on a corresponding wire passing through a cut-off relay to ground.

Like the circuits of the Sterling Electric company and of the Western Electric company in its No. 8 board, described

some months ago, the line relay of this system is a permanent bridge upon the line. The common battery is serially connected between the two windings of that relay. As in those systems, also, the line signal is operated by a single contact of the line relay. The similarities, however, cease at this point, for in the North circuits, the line lamp is extinguished by having its circuit immediately opened by a single contact of the cut-off relay, while in the Sterling system shunting means are utilized, and in the No. 8 board of the Bell company the shunt circuit is mechanically opened by the action of the plug in the jack.

In both the Sterling and Bell No. 8 systems, the subscriber's talking current is received by him solely from his line relay, and the resistance of its windings must be some compromise, in those systems, between being low enough to furnish ample current for standard transmission, and being high enough to permit all necessary ringing to be done over the line without harmful shunting of the permanent bridge of the line relay.

In the North system the line relay does not serve as the sole means of furnishing current to the subscriber, being supplemented by another path existing when the cord circuit is in position. In the system illustrated, the total bridge of the line relay on the line is 600 ohms, the windings are balanced, and no hurtful inductive effects should result from the arrangement. The cord circuit is similar to the Kellogg cord circuit in one particular, this being that two separate batteries may be utilized if desired, one supplying all answering cords, and the other all calling cords. Like the Stromberg-Carlson circuit of last month and the Kellogg circuit of this month, a condenser in each line conductor of the cord circuit serves as the inductive link for voice currents. Each half of the cord circuit has bridged upon it a double wound relay related to the talking strands exactly as is the line relay to the line conductors. When the cord circuit is in place, therefore, each line relay is supplemented by a supervisory relay. The windings of the latter are less than half the resistance of the former, and this without lowering the resistance of the bridge over which one must ring. So far as direct current is concerned, therefore, these joint paths offer but 166 ohms resistance.

While the subscriber's telephone is on the hook, the supervisory relay will not be energized and current will flow to the cut-off relay over two paths. One of these is through the supervisory lamp and another through a resistance in parallel with it in the amount of 500 ohms. This current is sufficient to operate the cut-off relay, and the lamp gets enough of it to give a satisfactory signal. When the subscriber answers, however, the lamp circuit is entirely opened while 200 of the 500 ohms resistance are short circuited, leaving a path of but 300 ohms to the cut-off relay. The consumption of current, therefore, during conversation, is approximately that which exists before and after conversation, and there is not, as in the Bell cord circuit described last month, an excess of current consumption during the long period of converastion.

In all particulars, except the arrangement of ringing and listening keys, the two halves of the North cord circuit are identical. Due to the arrangement of the supervisory relay no elaborate testing connections are necessary and the disturbance of the tip potential by engaging a busy test ring is sufficient to apprise the operator that the tested line is elsewhere engaged.

Applying again the practice of analysis to the line and cord circuits so described, it should be easy to determine for either system the exact location of any trouble which may arise. Within the scope of the following suggestions should be found the counterpart of any general trouble not specifically treated herein:

The line relay fails to operate when the subscriber calls.—In the Kellogg system the line relay may really be disconnected from the line due to a failure of one or the other of the back contacts of the cut-off relay. It is to be remembered that the line relay depends as much on the contact of the grounded side of the cut-off relay as it does on the contact at its own side.

In the North system the connection of the line relay permanently upon the circuit eliminates the possibility of an open contact at the cut-off relay; on the other hand the responsibility of two contacts in the lamp circuit is introduced, as against one in the Kellogg system.

With either the Kellogg or North arrangement, the line relay difficulty may be tested by bridging its leads successively further and further away from it until a point is reached within the office, when bridging will not pull it up. The open point will then be found between the last and next to the last tests.

The line relay will not fall away when the operator plugs in.—It is only in the Kellogg system that this fault need be sought, as it will be noted that the North line relay is expected to remain energized during all the time the subscriber's telephone is off the hook. In the Kellogg system the probable causes are a fault in the adjustment or the failure of the cut-off relay to open its contacts as it should.

The line relay armature responds but the line lamp is not lighted.—The armature may respond without successfully closing its lamp contact, and this should be examined with care. In the North system, the contact of the cut-off relay also must be examined to see if it is made when the cut-off relay is not energized. In other particulars the two systems are alike, in that responsibility for lamp failure may rest upon the lamp filament, the lamp terminals, the springs of the lamp sockets, the lamp wiring, or in the fuse which supplies current to that lamp or group of lamps.

The line lamp burns and the operator answers, but cannot speak to the subscriber.—In the Kellogg system it is to be suspected that the subscriber's line has not been successfully cut through to the multiple, as there is a possible, though not a probable, chance of failure at this point. Having determined whether the trouble exists both with relation to the answering jack and multiple jack, the open point may be hit upon with accuracy. If, however, the operator can speak to the subscriber with one answering plug but not with another, it is evident that the fault lies in the cord circuit.

The line lamp is lighted but will not go out when the operator plugs into the answering jack.—In the Kellogg system the manifest trouble is that the line relay did not break the lamp circuit when it was cut off from the line, or that the cut-off relay did not disconnect it from the line as it should. In the North system, remembering that the line relay is expected to remain closed, the continuance of the line lamp to burn is due to a failure of the cut-off relay to open the lamp circuit. The lamp contact may even be broken by the cut-off relay and yet a path exist through adjacent conductors for the line lamp to remain a signal.

The line lamp is lighted when a subscriber is called.—In the Kellogg system the likelihood of this trouble existing is exceedingly small, as the switchboard and line relay may not easily be connected to a given line at the same time. In the North system it is only necessary that the cut-off relay fail to break its signal contact while ringing current is passing over the line. The line relay will in such circumstances make its effort to light the lamp, and unless this is prevented by the cut-off relay a spasmodic signal will result.

The operator cannot ring.—In addition to the usual possible failures of the ringing key contacts to place the ringing source in connection with the line, there is the possibility, in the Kellogg system, of the circuit containing the resistance *d* being open. If this is so, the cut-off relay will not be operated and the effort to ring will be merely to place ringing current on an open pair of wires.

In the North system there are no other than usual conditions in this regard.

No busy test is obtained though the line is busy.—In the

Kellogg system a failure of relay *c* to operate satisfactorily will prevent the operator from getting busy tests from any lines within her reach, whether busy or non-busy. Granting this to be in good condition, a failure with either the Kellogg or North system to receive a busy click indicates the absence of potential on the test circuit, and thus a fault in the distant cord circuit which should be holding that test potential on. When there is a break in the test wires between the place where the test is successfully applied to its circuit and cut-off relay and the point where the testing is being done, no test will be received, and the break must be traced down and closed.

THE TELEPHONE LINE

Abstract of a Paper Read before the American Institute of Electrical Engineers at Pittsburg

By S. P. Grace

THE great increase in the number of telephones during the past ten years has been widely commented on in both the public and technical press. Unless one is confronted with the figures it is somewhat difficult to comprehend the extent of this enormous growth. It does not need a large imagination to conceive the magnitude of the system if the present rate of increase keeps up. To give service to all these telephones there has been splendid work done by the telephone engineers in the designing of telephones and switchboard apparatus which would furnish rapid and reliable service. As important as the telephone instruments and the switchboard apparatus are, a little consideration will make clear to us that the telephone lines connecting the subscribers to the exchange are of still greater importance. This is so because of the electrical and mechanical problems to be solved and because of the large sums required for building the lines to the subscribers' premises. In a modern plant it is safe to say that the switchboards, instruments and buildings represent not over twenty-five per cent of the total plant cost, the remainder being expended in building the distributing lines. It is evident, therefore, that the economies of line distribution should be thoroughly understood in order that a plant will be built with the smallest annual charges, for the telephone being not a luxury but a necessity to the business and social interests of our cities, every effort should be made to furnish service at a reasonable cost and therefore the most economical system of line distribution must be earnestly sought for. It is to be regretted that in the past the same careful engineering study given to switchboard problems has not also been applied to the engineering and economic problems of line distribution.

In considering the development of systems for distributing telephone lines it will not be amiss to look back and run over hastily the various methods which have been proposed and used for this purpose. Before the introduction of the telephone there already existed the lines of the various telegraph companies, and it was but natural that when the telephone came into the field the construction of its lines should follow the same general practice as developed by the telegraph companies. It was soon found, however, that the number of telephone lines multiplied much more rapidly than did the telegraph wires, the result being poles of great height, equipped sometimes with as many as twenty cross arms, each arm carrying from ten to twenty wires. When these lines became overcrowded, it was customary to relieve them for short distances with aerial cables made up of rubber-covered wires. A little later the dry core lead-sheathed paper cable was invented, and it was largely used to supplement the open wire leads. These heavy open wire leads were subjected to many disturbances because of sleet and wind storms, and furthermore they became such an "eye sore" that in many cities the wires were ordered underground in the business districts.

It is interesting to note that the first underground distributing conduit system for telephone wires was installed by Mr. Metzger and Mr. Paynter of the Central District and Printing Telegraph Company in Pittsburg in 1881, on Fifth avenue, between Wood and Liberty streets. The roof fixtures had become too heavy for the buildings supporting them, and as permits for poles on the streets could not be secured, it became imperative to place the wires underground. The cables were laid in the bottom of a wooden box and immediately over them was placed, at intervals, porcelain plates containing forty holes, through which were pulled distributing wires to be run into each basement along the route. After the cables and wires were in place the entire box was filled with pitch, and this construction gave fair service for a short time. It was only a short time, however, until all forms of "solid systems" in Pittsburg and in other cities were abandoned in favor of the "drawing in system," the standard practice calling for vitrified clay ducts, into which the cables could be readily drawn and withdrawn. The direct underground connection of subscribers' lines was abandoned practically everywhere on account of its cost, in favor of the distributing pole connected to the underground cables, from the top of which radiated wires to the various subscribers' premises. In the districts outside of the congested business district it continued to be the practice of most companies for many years to adhere to the tall, open wire leads, supplemented with aerial cables. However, the company early developed a system of distribution by means of aerial cable placed on low poles and provided with terminals every two or three hundred feet, which has given excellent satisfaction for a number of years and is now being extensively used. A more complete description of this system will be given later on in this paper.

The development of telephone line distribution having thus been briefly sketched, let us consider what, in the present knowledge of the art, can be considered the best practice of to-day for the distribution of the subscribers' telephone lines. It has been many times recommended and demanded by those not experienced in the art, that all telephone wires should be placed completely underground, and these persons point to the water and gas systems as an example. There is, however, a fundamental difference between these systems, usually lost sight of. In the case of gas and water, one pipe is common for an entire street and may be tapped anywhere along its length. In the case of telephone distribution we must provide a separate pair of wires all the way from the exchange to each subscriber's premises, and no common line can be tapped, as is done in the gas and water systems. This makes the difficulties and the expense of direct underground connection very great, and if enforced, would necessarily result in a large increase in the cost of service to the subscriber.

In modern engineering practice, before building and dis-

tributing routes in any city or district, it is customary to prepare a development study which shows the number of subscribers to be expected at the end of definite periods for the next twenty years, and also to predict the probable routes and the number of ducts required for this distribution. From studies recently made it seems best to limit the number of wires carried in cables on pole lines to about 400 pairs, and that above this limit the distribution should be made underground. On this basis it will be seen that it is economical to extend the underground conduit system along what might

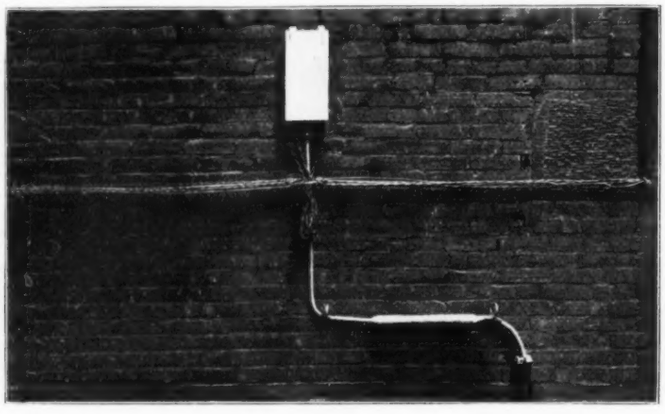


Figure 1.

be called "feeder routes" throughout the residence sections of the city. In districts where there are underground conduits it is safe to recommend that direct underground connections be made to the various buildings, wherever the number of telephones in each building will justify the expense of such a connection. This is particularly true of office buildings, apartment houses, large stores, hotels, etc.

Where direct connection is not economical the vault system or the wall wiring system may be used. In the vault system a cable is run into one of the basements in the block, and from its terminal are carried distributing wires through the other vaults to the various telephones. This system is limited in its application, because of the irregularities and sometimes the absence of vaults, and because of the objections of property owners to having the telephone company's employes frequently passing through their basements. In the wall wiring system a small terminal is placed on the rear wall of one of the buildings, and from it are run,

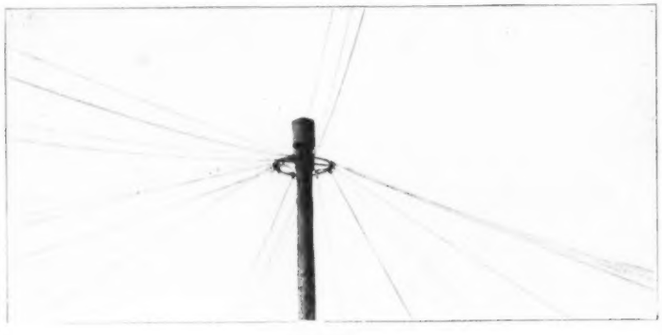


Figure 2.

through rings, twisted No. 18 B. & S. soft copper, rubber-covered and braided wire to the different telephones. This type of distribution is very neat, economical in first cost, and the maintenance, because of the protected condition of the wires, is very small. It will be found that this style of distribution is particularly suited to second-class business districts and first-class residence districts in the vicinity of underground conduit routes where the buildings are built close enough together to prevent long spans of ring wiring. In Figure 1 is shown a typical example of this kind of wiring. Where the buildings are very much scattered and the lot and building lines irregular, it seems that some form of a distributing pole will furnish the best and most economical service, pending the time that the block is so closely built up as to warrant direct connection or wall wiring. It is possible to design this type of pole with a small circle top, and if the wires are strung from it in a neat manner, without attempting to encompass too much territory, the effect, although not beautiful, is not displeasing. A typical example of distribution from a distributing pole is shown in Figure 2. In Figure 3 is shown the wiring of one of these poles at close range.

After agreeing that the main feeder routes should be underground and after providing for distribution in the immediate vicinity of these routes by means of direct connection, vault or wall wiring systems, as described above, there still remains the problem of distributing aerially the sub-

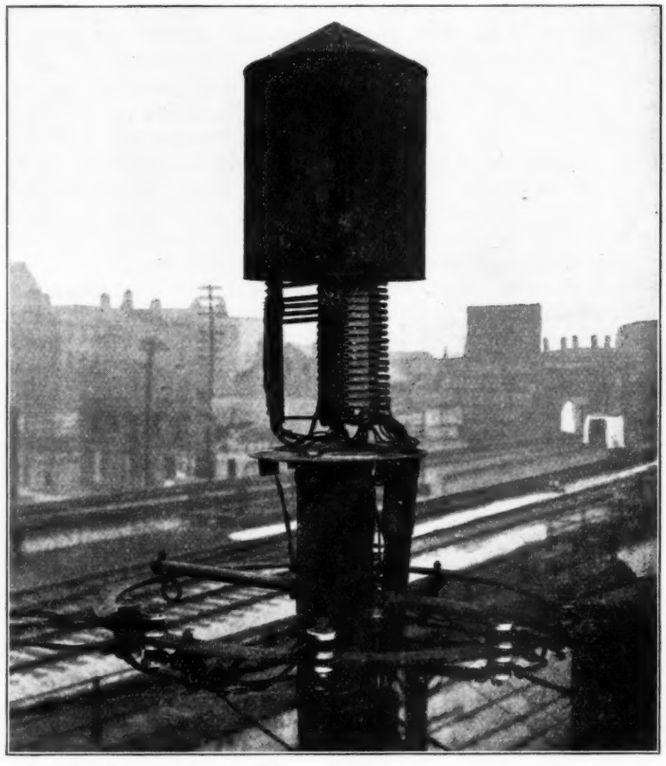


Figure 3.

scribers' lines on the many side streets. In the majority of our cities to attempt to make such distribution completely underground would either financially involve the telephone companies or else make the cost of service prohibitive to the subscribers. As explained earlier in this paper the aerial distribution of telephone lines has in the past largely been done by means of tall open wire leads, supplemented with aerial cables. On account of the rugged character of the territory of the Central District and Printing Telegraph Company, the streets in the various towns are, as a rule, very narrow and crooked, which made extremely difficult the building of tall, open wire leads for distributing telephone lines.

Early in the year of 1898 it became apparent to the engineers of the company that some new form of construction must be developed if it was hoped to distribute aerially the thousands of wires being required by the rapid expansion of the business of the company. An aerial cable system of distribution was conceived by Mr. Bliss and Mr. Snyder of the engineering department, and they, in conjunction with Mr. Donaldson of the construction department, proceeded to prepare plans for its installation. Since 1898 the aerial cable method of distribution has been followed exclusively

in the territory of the company wherever it was desired to distribute subscribers' lines aerially. Low poles of thirty to thirty-five feet in length have been used and aerial cable placed at the top of the poles. On alternate poles and sometimes on every pole, was placed a ten-pair junction box.

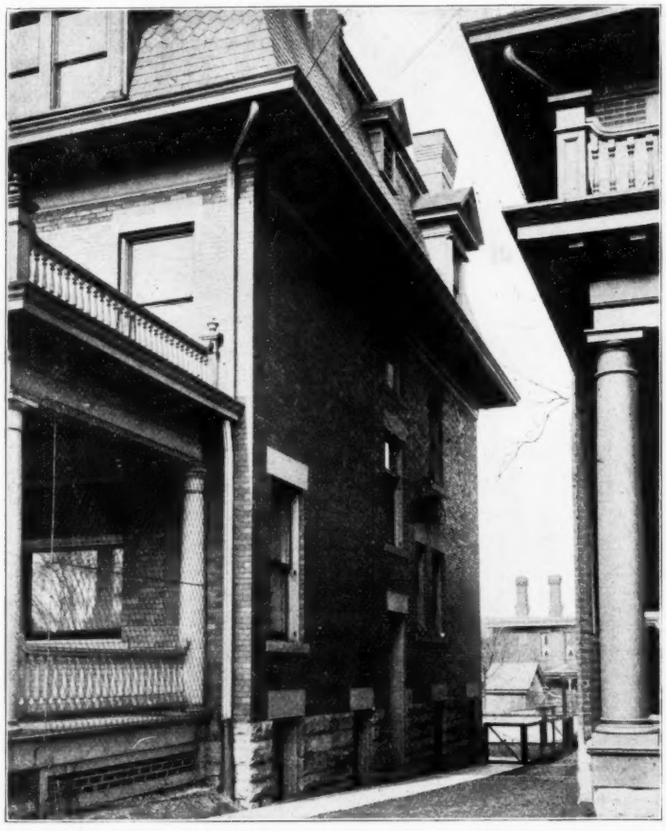


Figure 4.

Each pair usually appeared somewhere along the lead in from two to three separate terminals, so it was possible to make use of any particular pair at different points, and furthermore the multiplying was so arranged as to permit the economical grouping of party lines. From the lock nuts

Figure 5.

of the terminals No. 14 B. & S. gauge copper, rubber covered and braided twisted pair wire was strung direct to the protector at the subscriber's premises, no crossarms being used along the lead. On account of the short length of rubber insulated wire used in running the subscriber's loop no protection is necessary at the cable terminal, but each line should be fused at the place where the aerial cable is connected to the underground cable. A cable system of this kind is highly useful for distribution at right angles to underground conduit base lines and along streets that will in the future be provided with underground subways. Construction of this kind is not an "eye sore," does not invite criticism, and the result is that underground legislation lies dormant for many years. An example of this style of construction is shown in Figures 4, 5 and 6, and a detail of the construction in Figure 8.

Because of the large number required, an important part of an aerial cable system is an efficient and economical terminal. About two years ago this matter was carefully investigated and a terminal designed which was low in first cost, low in maintenance, and possessing a long life. This terminal is built up of essentially two elements, a cast iron box and a porcelain block for mounting the lock nut terminals. In developing this terminal the first point insisted upon was the use of a dry core cable for the tapping cable, which form of cable is cheap and besides is easily handled

Figure 6.

and spliced by the cable splicers. A drawing of this terminal is shown in Figure 7. It can be used for vault wiring, wall wiring, and on poles for aerial cable lines. The cost of a ten-pair size is $2.45, and it is believed that the life will be at least fifteen years. The labor of placing and splicing is $1.70 when connected to a fifty-pair cable, and the material used for splicing amounts to $1.15, which makes the cost of a complete ten-pair terminal $5.30. This type of terminal has been in service nearly two years, and tests in all kinds of weather have shown them to have a high insulation resistance.

About two years ago a number of studies were made to determine the most economical system, or in other words the system having the lowest annual charges, for distributing telephone lines aerially. The annual charge is made up of interest, taxes, depreciation and maintenance, and it is apparent that the system having the lowest first cost may not be the most economical in the long run. Different groupings of subscribers were assumed and their distribution was

effected by open wire systems, aerial cable systems, aerial cable with taps on every pole, aerial cable supplemented with bare wire, etc. It was found as a result of these studies that the aerial cable system with taps on alternate poles and with rubber covered wire, directly connected from the aerial cable terminals to the protector in the subscribers' premises, was generally the most economical. This system besides being the most economical is by far the most sightly of any form of aerial distribution.

It is obvious that on many streets where there are but a few telephones it would not be economical to place an aerial cable at once, but the distribution must be initially effected either with bare wire or twisted pair rubber cov-

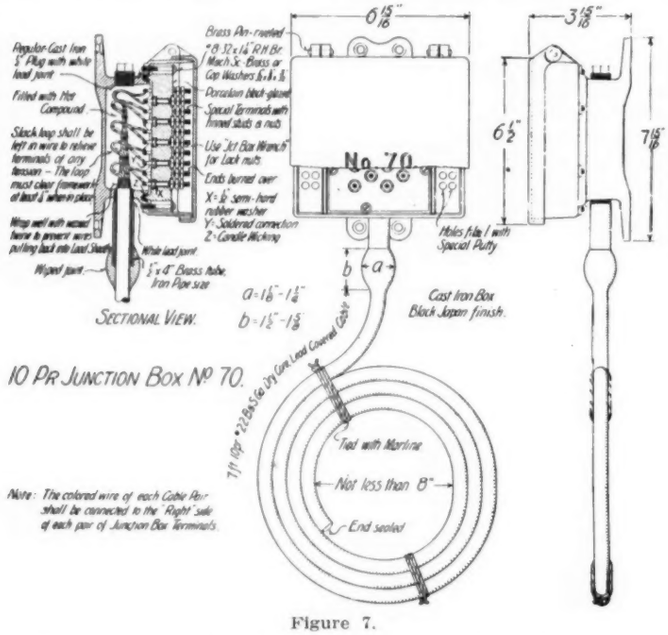

No. 70
SECTIONAL VIEW.
10 PR JUNCTION BOX Nº 70.
Cast Iron Box
Black Japan finish.
Tied with Marline
Not less than 8"
End sealed
Note: The colored wire of each Cable Pair shall be connected to the 'Right' side of each pair of Junction Box Terminals.

Figure 7.

ered wire. A study of these cases showed that it was economical to distribute all telephone lines within a thousand feet of aerial cable routes with twisted pair wire strung on iron distributing brackets, no crossarms being used. Where the distance exceeded one thousand feet and where there were no obstructions in the way, it proved to be economical to distribute with No. 14 N. B. S. bare copper wire placed on crossarms, the loop to the house, however, being run with twisted wire. It was further proved that it was desirable both from an economical standpoint and from the standpoint of appearance and service to replace the bare or covered distributing wire with an aerial cable when there was an average of about ten circuits on the line. The study also showed that when this cable was placed it was economy to remove the old distributing wire, and not attempt to use it by placing taps on the cable far apart. It may be taken as fundamental that it is not economical to parallel cable wires with outside distributing wires strung on crossarms or brackets. The cable should be so tapped as to make the length of the subscribers' loops a minimum. This last point is very important and every effort should be made to extend the cable system and make the subscribers' loops of a minimum length. If this is done it is economy to construct them of high-grade material, i. e., of first quality twisted pair rubber insulated and braided copper wire.

Summarizing, it would seem that the following rules for distributing telephone subscribers' lines may be followed with economical results.

First. That where the number of circuits will exceed 400, underground subways be built, and the distribution in the immediate vicinity of these feeder routes be effected by direct connection, vault systems, wall distributing systems, or circle top distributing poles, according to local conditions.

Second. That where aerial distribution is resorted to a cable be placed on low pole lines, in general not exceeding 35 feet in height, if the number of subscribers will justify the expense of placing the same. This cable is to be provided with ten or fifteen-pair terminals without protection on alternate poles, from the lock nuts of which to the subscribers' premises the connection should be made with twisted pair No. 14 B. & S. gauge, hard drawn copper wires, insulated with a high grade of rubber compound and protected with heavy, separate braids. Where the distribution is very dense a tap may be placed on every pole, and in thinly settled districts through which the cable may pass, a tap should be placed wherever by so doing 300 feet of twisted pair wire can be saved.

Third. That on side leads at right angles to aerial cable lines, twisted pair wires strung on brackets should be used for distribution to subscribers located within a thousand feet of the cable line. If the subscribers are at a greater distance than one thousand feet, all distribution on these side leads should be effected by means of No. 14 N. B. S. bare copper wire, strung on standard crossarms, provided there are no obstructions in the way such as trees, foreign wires, etc., which would necessitate the use of high poles. If obstructions are met with a special study should be made to determine which is most economical: the setting of high poles, the use of twisted wire on low poles, or the placing of a cable.

Fourth. That when the number of circuits on a pole line reaches ten to fifteen, a cable should replace them. This cable should be provided with terminals on alternate poles so that the bare wire or covered wire formerly strung along the lead for local distribution can be removed and returned to stock, since as before stated, it is not economical to parallel cable wires with bare or covered distributing wires.

It is certain that in the coming years the number of telephones is going to increase at a most rapid rate, and the engineer has before him a difficult problem in designing and constructing the lines necessary to connect these telephones to their exchange centers. It is true that as the number and

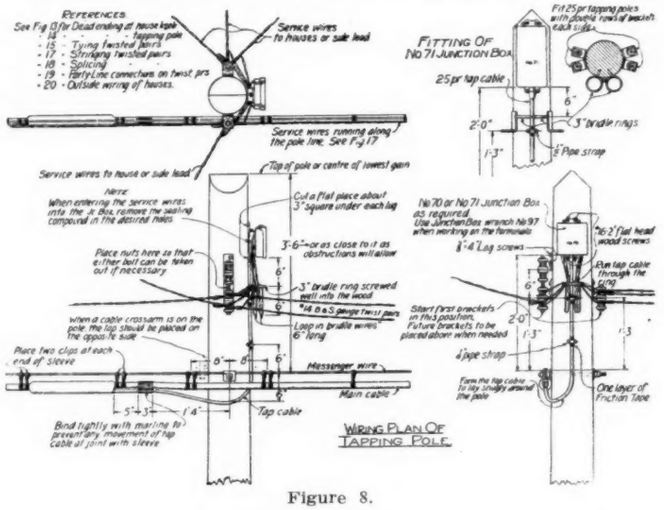

WIRING PLAN OF TAPPING POLE
FITTING OF No 71 JUNCTION BOX
Service wires to house or side lead
Service wires running along the pole line. See Fig 17
Top of pole or centre of lowest span
Messenger wire
Main cable
Tap cable
25pr tap cable
3" bridle rings
4 Pipe strap
No 70 or No 71 Junction Box as required.
One layer of Friction Tape

Figure 8.

therefore the telephonic density increases, the line construction cost per telephone is very materially reduced, and it may be that some time in the future we can see the way clear for a complete underground distribution of all telephone lines on the most important streets of our cities. I believe, however, that this period is many years ahead, and it can well be asked, Why should the telephone companies, and therefore the public served by them, be burdened with the additional expense entailed by complete underground distribution as long as it is possible to economically distribute in a slightly different manner from properly designed aerial cable lines?

DICTIONARY OF TELEPHONE WORDS, TERMS AND PHRASES

By W. H. Radcliffe

[In the following dictionary of words, terms and phrases used by telephone men and in telephone work the author's aim has been to be clear and lucid in all definitions and above everything else to be brief. The work will be found accurate and comprehensive. This is the first compilation of this kind and its general use will do much towards standardizing telephone words, terms and phrases. It will be found an indispensible guide to telephonists and its study will be profitable to those engaged in the work.—THE EDITOR.]

A

A-board.—That part of the operators' switchboard designed for receiving calls and making connections for local subscribers.

Adjustable resistance.—See Rheostat.

Aerial line.—See Pole line.

Air line.—See Open wire line.

Air space lightning arrester.—A protective device consisting of two metal plates separated a fraction of an inch from each other, and connected respectively with the line wire and ground. Lightning on the line jumps the air space in preference to passing through the wiring of the instrument, and is thus harmlessly conducted to ground.

Alley line.—See Distributing line.

Alternating current.—A current of electricity flowing alternately in opposite directions.

Amalgamated zinc.—Zinc which has been dipped in mercury.

Ammeter.—An instrument for measuring, in amperes, the strength of an electric current.

Ammonia fortis.—A concentrated solution of ammonia.

Ampere.—The unit of current strength. Its value may be expressed as that quantity of electricity which flows through a resistance of 1 ohm when impelled by a pressure of 1 volt.

Ampere-hour.—A quantity of electricity equivalent to a current of 1 ampere per hour.

Anchor.—A device for holding telephone poles to the ground in order to resist the tension of the line wires.

Anchor pole.—The pole on which the conductors of an open wire line are dead-ended.

Answering board.—See A-board.

Answering jack.—The jack used only in answering subscribers' calls.

Answering plug.—A plug used only in connecting with the jacks of subscribers making calls. The answering plug is placed next to the face of the switchboard, on the cord shelf.

Answering subscriber.—A telephone subscriber with whom a connection is desired.

A-position.—Comprises the operator's equipment on an A-board and the apparatus and wire used on the subscriber's local circuit.

Armature.—A bar of soft iron extending across the pole pieces of a horseshoe magnet, or a metal core surrounded by coils of insulated wire revolving near the pole pieces of a magnet in a dynamo-electric machine.

Automatic coin-collecting pay station.—A sub-station at which telephone service may be obtained by anyone depositing thereat a coin of the required denomination.

Automatic signal.—A magnetic drop or an incandescent lamp that does not require attention to restore it to its normal condition after giving a signal.

Automatic signal board.—A telephone switchboard in which both calling and clearing-out signals are given automatically upon the removal and replacement, respectively, of the receiver on the hook.

Automatic signaling system.—A telephone system in which the signaling current is generated in the exchange, and the talking current is obtained from primary batteries in the telephone instruments.

Automatic switch.—A switch sometimes connected in circuit between a storage battery and the charging generator, and which opens automatically when a change occurs in the direction of the current.

Automatic system.—A telephone system in which the connections between subscribers are made automatically in the exchange.

B

Back board.—The wooden board on which is mounted the subscriber's telephone instrument.

Back electromotive force.—See Counter electromotive force.

Balanced line.—A complete metallic telephone circuit in which the ohmic and insulation resistances on each side of the circuit between exchange and instrument, are equal.

Balcony.—A small platform attached to a terminal pole, on which wiremen may stand when working at the cable head.

B. and S. gauge. (Brown and Sharpe's gauge).—An instrument for measuring the diameters of wires.

Bar magnet.—A magnetized bar of hard steel.

Battery.—A number of primary or secondary cells operating as a single source of current.

Battery cell.—A single element of a battery, consisting, generally, of a jar filled with an exciting fluid in which two metals are immersed.

Battery cell solution.—The exciting fluid in a cell, which acts chemically on one of the battery elements for the production of electricity.

Battery elements.—The parts of a battery cell acted upon by the exciting fluid for the production of electricity.

Battery plates.—See Battery elements.

Battery wires.—Conductors employed in transmitting electricity for other than talking purposes.

B. B. (Best Best).—A commercial abbreviation for a certain grade of iron wire; this grade is best adapted to telephone line construction.

B-board.—That part of the operator's switchboard designed for receiving calls and making connections for subscribers local to other exchanges.

Bell.—See Magneto-bell.

Biased Bell.—An electric bell used as a selective signal in party line systems, the bell having its armature pulled in one direction normally by a spring so that it may be operated by pulsating currents of one polarity but not by pulsating currents of the opposite polarity.

Bichromate battery solution.—A solution of bichromate of potash, sulphuric acid, and water.

Binding post.—A screw clamp for fastening a conductor to an electrical instrument.

Binding wire.—Brass, phosphor bronze, or steel wire wrapped around the armature of a dynamo-electric machine to prevent the armature windings from loosening and flying out when the armature is revolving.

Block system.—An arrangement in which one or more main cables are run from the central office, and afterward divided into branch cables, thereby extending the system to a number of distributing points in series.

Blue vitriol.—Copper sulphate.

B-operator.—See Trunk operator.

Bracing.—Strengthening or steadying a telephone pole by means of an additional pole.

Branch exchange.—A small exchange giving, principally, local service to an isolated group of subscribers, but joined to an outside exchange by one or more trunk lines over which connections may be made when necessary.

Branch exchange trunk line.—A circuit running between the central office and a branch exchange.

Bridged party line system.—A non-selective party line system in which the subscribers' instruments are bridged or shunted across the line.

Bridging bell.—The magneto-bell used in the subscriber's instrument for a bridging connection.

Bridging connection.—An arrangement of sources or utilizers of electricity formed by placing all the positive terminals in electrical connection with each other, and all the negative terminals in electrical connection with each other, so that the current divides among the branches thus formed.

Bridging generator.—The magneto-generator used in the subscriber's instrument for a bridging connection.

Bridle wires.—Short wires within a cable head joining the conductors of a cable to open wire lines.

Brush.—One or more strips of metal, or a block of carbon, pressing on the commutator of a dynamo-electric machine and acting as a conductor of electricity to or from the armature.

Brush holder.—A device for holding a brush and adjusting its pressure on the commutator.

Buckling of plates.—A term applied to the plates of a storage battery cell, when from being overcharged they twist out of their normal position.

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Bus bar.—The main bar, wire, or strip conducting a current of electricity.
Busy line.—A telephone line or circuit in actual use.
Busy test.—The method employed by an operator to determine if a line or circuit is being used.
B. W. C. Systems. (Barrett-Whittimore-Craft Systems).—Selective party line systems in which six or less subscribers are connected to one line, and the signaling accomplished by direct or pulsating current traversing the bell circuits in different ways.

C

Cabinet desk set.—A subscriber's telephone instrument mounted in a cabinet or desk at which the subscriber may sit and write while using the telephone.
Cable box.—See Cable head.
Cable core.—The insulated conductors of a cable.
Cable entrance.—See Cable run.
Cable form.—A length of switchboard cable having the conductors at one end fanned out, lashed, tested out, marked, and varnished for connecting with the spring jacks, etc., on the operators' switchboard.
Cable hanger.—A device for fastening a telephone cable to the messenger wire.
Cable head.—A water-tight iron box with binding posts projecting through its sides, by means of which the conductors of a cable may conveniently be connected to open wire lines.
Cable joint.—The injunction between the conductors of two cables.
Cable line.—A telephone line consisting of a number of insulated conductors twisted together in pairs, bound in the form of a cable, and surrounded by a protective covering.
Cable reel.—The frame on which the cable is wound when purchased.
Cable run.—The passage and supporting fixtures occupied by overhead or underground cables from the street to the exchange.
Cable sheath.—The protective covering of a cable. The sheath is usually of lead between 1-12 and ⅛ inch in thickness.
Cable terminal.—See Cable head.
Calculagraph.—An instrument used in recording the time occupied by a long distance telephone conversation.
Call.—See Message.
Call circuit key.—See Order wire key.
Calling plug.—A plug used only in connecting with the jacks of subscribers who are to be called. The calling plug is placed nearest the operator, on the cord shelf.
Calling subscriber.—A telephone subscriber desiring a connection with some other subscribers.
Call wires.—See Order wires.
Candle power.—A unit expressing the intensity of illumination, one candle power being the light produced by a spermaceti candle burning at the rate of 2 grains per minute.
Capacity test.—A test made with a reflecting galvanometer and standard condenser, generally to determine the number of microfarads capacity between the conductors, or between the conductors and sheaths of telephone cables.
Carbon plate arrester.—A device consisting of two carbon blocks separated by a strip of mica, and used to protect telephone apparatus from lightning.
Carbon transmitter.—A transmitter in which carbon is employed as the active agent in causing the sound waves of the voice to vary the strength of the talking current.
Central.—See Exchange.
Central office.—See Exchange.
Central office equipment.—The distributing boards, the operators' switchboard and accessories, and the power plant.
Central station.—See Exchange.
Central station protection.—The carbon plate arresters and heat coils mounted on the main distributing board.
Chief inspector.—See Wire chief.
Chief operator.—A person having complete charge of all the telephone operators.
Chief toll operator.—A person having complete charge of all the toll operators.
Circuit.—That arrangement of conductors and telephone apparatus which permits conversation to be carried on between two distant parties.
Circuit breaker.—A switch which opens automatically and thus breaks the circuit in which it is connected, when the current increases above a certain fixed value.
Circuit trunk operator.—A trunk operator on a multiple switchboard who receives the subscriber's call, through the subscriber operator, over a special order wire which terminates in a key at the subscriber operator's section and runs to the head receiver of the trunk operator.
Circular mil.—The unit of area when considering the cross-section of wires, one circular mil being equal to .0000007 square inch.
Cleared lines.—Subscribers' lines from which the operator's connecting circuit has been removed.
Clearing-out drop.—See Clearing-out signal.
Clearing-out signal.—A magnetic drop or a lamp wired in the connecting cord circuit of either the A-operator or B-operator, to enable the subscribers to signal her when a conversation is completed.
Clearing trouble.—Removing difficulties or defects of any nature in telephone circuits and apparatus.
Clip.—A strip of brass used to connect different conductors; it is shaped in the form of a U, the lower part of which is screwed to a support and the two wires to be connected are soldered to the respective ends of the strip.
Closed circuit cell.—A primary cell not subject to polarization, and which therefore may be left connected in a closed circuit when not in use.
Collector rings.—Copper rings used on alternating current dynamo-electric machines for collecting current developed in the armature windings.
Color scheme.—The method of dying the insulations of the various conductors in a telephone cable, different colors, for identification afterward at the two ends of the cable.
Combination key.—A switchboard key combining the functions of a ringing key and a listening key.
Come-along.—A device used in griping the line wire when stringing or repairing the same.
Common battery.—A battery of storage cells located in the exchange for furnishing the talking and signaling current in the common battery system.
Common battery board.—The switchboard used in the common battery system; it may be either of the transfer or multiple type, but those in commercial use are invariably of the latter class.
Common battery system.—A telephone system in which both talking and signaling current is supplied from a storage battery at the exchange.
Common return line.—A line in which one of the conductors consists of a wire somewhat larger in cross-section than the usual line wire, and which serves as a common return for a number of telephone circuits.
Common trunk line.—A trunk line used between small exchanges for outgoing and incoming messages.
Commutator.—A device employed on direct current dynamo-electric machines, by means of which the current is collected and changed in direction.
Complete metallic circuit.—A circuit composed entirely of metallic conductors.
Complete metallic telephone system.—A telephone system in which complete metallic circuits are employed.
Compound bar magnet.—A powerful bar magnet built up of a number of separately magnetized steel bars of the same size.
Compound horseshoe magnet.—A powerful horseshoe magnet built up of a number of separately magnetized horseshoe magnets of the same size.
Concentrated acid.—Strong acid as purchased commercially.
Condenser.—A device for accumulating or concentrating electricity through mutual induction between conducting plates which are separated by a dielectric.
Conductivity.—The reciprocal of resistance.
Conductor.—A substance offering but a slight resistance to the passage of an electric current.
Conduit.—An underground passage designed for a number of telephone cables.
Conduit section.—That portion of a conduit extending between manholes.
Connecting board.—See B-board.
Connecting circuits.—See Operators' circuits.
Connecting cord weights.—Weights attached by means of pulleys to the operator's connecting cords, for the purpose of keeping them independent of each other and thus preventing them from becoming tangled.
Connecting plug.—See Calling plug.
Connection.—See Message.
Connector.—See Clip.
Controlling relay.—See Cut-out relay.
Copper sulphate solution.—A solution of copper sulphate and water used in the gravity cell.
Cord circuits.—See Operators' circuits.
Coulomb.—The unit of quantity, it being that quantity of electricity passing per second when the current is 1 ampere.
Counter electromotive force.—A voltage tending to reverse the normal direction of a current.
Cross arm.—A wooden bar fastened at right angles to a telephone pole near its top, for holding the pins and insulators supporting the conductors.
Cross arm gains.—Grooves cut across a telephone pole for receiving the cross arms.
Cross arm pin.—A wooden support mounted on the cross arm for holding the insulator.
Cross talk.—Sounds developed in a telephone circuit by currents induced in the same from adjacent parallel conductors carrying current.
Current.—The rate of flow of electricity through a conductor.
Cu So4.—See Copper sulphate solution.

Cut-out.—A low resistance shunt which cuts out the armature resistance of a magneto-generator in a series telephone instrument, when the armature is at rest.

Cut-out relay.—A relay connected in the subscriber's circuit, which by controlling the line relay in this circuit, automatically cuts out the line lamp signal when the subscriber's call is answered.

Cycles.—One-half the number of alternations per second of an alternating current. Cycles per second are sometimes represented by the symbol —.

D

Dead-beat galvanometer.—A galvanometer so constructed that the needle assumes its deflection without oscillation.

Dead-ending a line.—Terminating the line wires on insulators.

Defective circuit.—A circuit not in good working order; the defect may be due to a broken, crossed, or grounded conductor.

Desk set.—A subscriber's telephone instrument in a compact and portable form, designed to be used on a desk or table.

Dielectric.—A substance that transmits electricity by induction instead of by conduction.

Diluted acid.—Acid weakened by the addition of water.

Dip.—The distance from the lowest part of a line wire between two poles, to a straight line joining its two points of support.

Direct current.—A current of electricity flowing in one direction.

Distributing line.—A telephone line which branches from a main cable running from the exchange.

Distributing pole.—See Terminal pole.

District.—A portion of territory supplied with telephone service by one exchange.

Don't answer.—A term applied to an unanswered signal.

Double cross arm.—Two similar cross arms mounted parallel to each other, one on each side of the pole.

Double fluid cell.—A primary cell in which two different exciting fluids are employed, the fluids being kept separate from each other either by their different specific gravities or by means of a porous cup.

Drawing-in a cable.—The process of pulling an underground cable through the duct provided for it.

Drop wires.—The telephone conductors running from the line wires to the outside wall of the subscriber's building.

Dry cell.—A primary battery cell in which the chemicals employed are in a dry or plastic state.

Dry core cable.—A cable whose core is not protected from moisture by being saturated in paraffin.

Duct.—An underground passage for a single telephone cable; it may be either a main duct or a lateral duct according to whether it carries a main cable or a cable branching off from the main cable to a distributing pole.

Duplex bracket.—A fixture attached directly to the pole, and designed to support two insulators.

Duplex pin.—A cross arm pin designed for holding two insulators, one at each end of the pin.

Dust transmitter.—A transmitter in which granulated carbon is employed as the active agent in causing the sound waves of the voice to vary the strength of the talking current.

Dynamo.—See Generator.

Dynamo-electric machine.—A machine for converting mechanical energy into electrical energy, or vice versa, by the rotation of conductors in a magnetic field. This term may be used, therefore, in referring to a generator, a motor, a motor-generator or a dynamotor.

Dynamotor.—A dynamo-electric machine in which is combined the characteristic of a generator and a motor.

E

Earth current.—An electric current flowing through the earth.

Efficiency.—The ratio of work performed to the energy expended.

Electric buzzer.—A simple modification of an electric call bell.

Electricity.—A form of energy produced by an agent which is usually rendered active by molecular disturbance, such as chemical action, rupture, or friction.

Electrode.—Either of the poles of a battery, or of a battery cell.

Electrolytic action.—Decomposition resulting from the passage of an electric current.

Electromagnet.—A coil of insulated wire wrapped around a piece of soft iron which becomes magnetized when a current of electricity passes through the coil, and which ceases to become magnetized when current ceases to pass through the coil.

Electromagnetism.—Magnetism developed by a current of electricity.

Electromotive force.—See Voltage.

Electrostatic capacity.—The quantity of electricity necessary to raise a conductor from zero to unit potential.

Encasement.—The material used to afford protection and give strength to the ducts of an underground line.

Exchange.—A large central office, or a number of smaller central offices connected by means of trunk lines over which subscribers locally connected to any one of the central offices may converse without paying toll charges.

Extension bell.—An electric bell usually wound to the same resistance as the main bell on the telephone instrument, and connected in multiple with it so that a telephone call may be heard in more than one place.

Extension instrument.—An extra telephone wired to the circuit of a subscriber's instrument and usually located in an adjoining room where it may be signaled, when necessary, by an electric bell or buzzer operated by the party answering calls at the main instrument.

F

Fanning out the conductors.—Spreading out the individual wires of a cable into the proper positions for them to make the necessary connections.

Farad.—The unit of electrostatic capacity, it being that capacity which will retain 1 coulomb of electricity at a potential of 1 volt.

Federal salt solution.—A battery solution used for the Leclauche cell in place of a sal-ammoniac solution.

Feeder cable.—A cable extending from the exchange to the distributing lines.

Field.—The space surrounding a magnet, which is traversed by lines of force.

Field coil.—A coil of insulated copper wire which, when placed around a suitable core of soft iron, constitutes the usual form of a field magnet.

Field magnets.—The magnets on a dynamo-electric machine.

Fish wire.—The wire threaded through a duct for drawing in a cable.

Flat rate contract.—A formal agreement between the telephone company and a subscriber, whereby the latter is given unlimited use of a telephone for one year.

Flexible wire cord.—An insulated conductor capable of being easily bent because composed of fine copper strands; the strands, however, must be sufficient in number to give the necessary cross-section for conducting the current.

Four-division multiple switchboard.—An operator's switchboard composed of four multiple boards, so connected that a calling subscriber is able to select a subscriber upon any one of the four, by pressing one of four buttons mounted on his instrument.

Frequency.—The number of cycles per second, of an alternating current.

Frying.—See Sizzling.

Fuse.—A wire or strip connected in a circuit to protect it from strong currents, and composed of an alloy of tin, lead, and bismuth which melts when its temperature is raised by the harmful current.

G

Galvanized wire.—Wire coated with zinc either by a galvanic process, or simply by being dipped in a molten bath of zinc.

Galvanometer.—An instrument used in measuring current or electromotive force, and consisting usually of a magnetic needle freely suspended within a coil of wire so that a current in the coil causes a deflection of the needle proportionate to the strength of the current.

Galvanometer shunt.—A variable known resistance connected across the terminals of a galvanometer to vary its sensibility, or to protect it from a strong current.

Generator.—A dynamo-electric machine for transforming mechanical energy into electrical energy.

Ground connection—An electrical connection with the earth, preferably made by a wire attached to a metal plate buried in permanently moist ground.

Grounded telephone system.—A telephone system in which the earth serves as a return conductor for each circuit.

Grounded wire.—A wire either intentionally or accidentally connected with the earth.

Guying.—Steadying a pole by means of a guy wire.

Guy wire.—A galvanized iron wire or a stranded steel wire used for steadying a telephone pole.

H

Hand receiver.—A receiver designed to be held to the ear by hand.

Head receiver.—A receiver held to the ear by a cap or band on the head.

Heat coil.—A protective device consisting of a small coil of fine wire, in the center of which a soldered plug is provided to hold a spring in a state of tension; the melting of the solder by an abnormal current releases the spring, which thereupon grounds the circuit through which the harmful current is passing.

Henry.—The unit of inductance, it being equal to the inductance of a circuit in which the variation of a current at the rate of 1 ampere per second induces an electromotive force of 1 volt.

Hook switch.—A metal arm provided in the subscriber's instrument for holding the receiver, and serving at the same time as an automatic switch to close the ringing circuit and open the talking circuit when the receiver is not in use, and to close the talking circuit and open the ringing circuit when the receiver is in use.

Horse power.—The unit of the rate of work, it being equal to 550 pounds raised 1 foot per second, or 33,000 pounds raised 1 foot per minute; it is also equal to 746 watts.

Horseshoe magnet.—A permanent magnet of steel shaped in the form of a horseshoe.

$H_2 So_4$.—See Sulphuric acid.

Hung up connection.—A connection between two subscribers who have completed a telephone conversation, but whose connecting circuit on the operator's switchboard has not been removed.

Hydrometer.—An instrument consisting of a weighted glass bulb provided with a long graduated stem, which is floated in a battery solution to determine its specific gravity.

I

Impedance.—The resultant of the ohmic resistance and the reactance in an alternating current circuit.

Impedance coil.—A coil of wire offering a high inductive resistance to an alternating current.

Incandescent lamp.—An electric lamp designed to be made luminous by the heating power of the current.

Inclosed fuse.—A fuse incased, usually by a fiber tube in which a vent hole is provided for the escape of gases that form when the fuse is blown or melted.

Inclosed wiring.—Wiring composed of insulated conductors incased by a tube or moulding.

Incoming trunk line.—A trunk line over which messages are received.

Induced current.—A current developed in a closed circuit by a variation of the magnetic field in its vicinity.

Inductance.—See Reactance.

Induction coil.—An apparatus used in telephony to increase the potential of the impulses produced by the transmitter, and composed of two separate concentric windings enclosing an iron core; one of the windings, called the primary coil, consists of a number of turns of large wire connected in series with the transmitter and battery, and the other winding or secondary coil consists of a comparatively large number of turns of small wire connected in series with the line.

Inductive disturbance.—See Cross talk.

Inductively.—By means of induced currents.

Inductive resistance.—See Reactance.

Insulated wire.—A conductor covered or supported by an insulating substance for preventing the passage of electricity to or from the conductor.

Insulation resistance.—The ohmic resistance offered by an insulator to a leakage of current. Insulation resistance is usually expressed in megohms.

Insulator.—A substance offering much resistance to the passage of an electric current.

Intercommunicating system.—A telephone system in which the terminals of all the telephones appear at each subscriber's instrument where the desired connections are made by the subscriber, independently of any central office.

Intermediate distributing board.—An iron frame located between the main distributing board and the operators' multiple switchboard, and provided with terminals to facilitate any desirable distribution of the subscribers' circuits.

Intermittent current.—See Pulsating current.

Internal resistance.—The ohmic resistance of a dynamo-electric machine, or of a battery cell, between the binding posts or terminals.

Iron pipe guard.—A circular frame of iron placed around a manhole opening to afford safety to the public without, and to the workmen within.

Iron pipes.—Long tubes of iron, lined inside with cement, and joined together lengthwise for underground conduits.

J

Jack.—A device consisting of one or more brass springs and a brass ring, each joined to a conductor and held in an insulating frame; the whole is so designed that a brass plug with a corresponding number of conductors attached, may be inserted in the ring and make contact with the ring and springs, thereby completing the circuits between the various parts of the jack and flexible wire conductors joined to the plug.

Joule.—The unit of work, it being the work done or heat generated by 1 watt in a second, and equal to .7373 foot-pound.

Jumpers.—Short flexible wires generally used as temporary connections between the parts of a circuit.

K

Key.—A switching device by means of which different circuits may readily be connected and disconnected.

Keyboard.—A hinged cover on the operators' switchboard, upon which are mounted the ringing and listening keys.

Kilowatt.—One thousand watts.

L

Lamp signal.—An incandescent lamp of low candle power, employed on the operators' switchboard in place of a magnetic drop, for signaling purposes.

Lamp, stand, and scale.—A kerosene lamp, a wooden stand on which is mounted a telescope, and a graduated scale for measuring the deflections of a reflecting galvanometer.

Lateral cable.—An underground cable running between a distributing box or main cable, and a building terminal or terminal pole.

Lead covered cable.—A telephone cable protected by a lead sheath 1-12 to ⅛ inch thick.

Lead sleeve.—A pipe of lead about 2 feet in length and between 2 and 3 inches in diameter, used to join the lead sheaths of two spliced cables.

Life of a pole.—The time during which the material of a pole remains in good condition.

Lightning arrester.—A device used to protect electrical apparatus from lightning, by affording the discharges a more direct path to earth.

Lighting protector.—See Lightning arrester.

Line drop.—A magnetic drop connected into a subscriber's circuit.

Line lamp.—A lamp signal used by a subscriber to signal the operator.

Line plant.—See Wire plant.

Line pole.—A wooden pole used in supporting the main portion of an overhead telephone line.

Line relay.—A relay by the use of which a subscriber is enabled to signal the operator.

Lines of force.—The curves in a magnetic field which represent by their positions the directions of resultant magnetic forces.

Line wire guard.—An iron bar screwed to a cross arm near its end, to prevent the line wire from falling in case of accident to the end pin.

Line wires.—Telephone conductors extending between the central office and the subscribers' instruments.

Listening In.—See Supervising a connection.

Listening key.—A key by means of which the operator may connect her telephone circuit to a subscriber's circuit, and listen to his orders.

Live circuit.—A circuit carrying current.

Load curve of a central office.—The curve formed by plotting the number of local calls received as ordinates, and the timein hours as abscissae.

Local action in battery.—Chemical action taking place in battery cells when not in use.

Local circuit.—A circuit composed of one wire and the earth, or of two wires, extending from the subscriber's instrument to the exchange.

Local subscriber.—See Telephone subscriber.

Long distance line.—A toll line passing through the exchanges of several telephone companies.

M

Magnet.—A body possessing magnetism.

Magnet core.—That portion of an electromagnet surrounded by the windings.

Magnetic drop.—An electromagnet so designed that when excited, it attracts an armature which permits a shutter to fall by gravity and thus draw the attention of the operator.

Magnetic resistance.—The resistance offered to the passage of magnetic lines of force.

Magnetism.—That quality possessed by a body which renders it capable of attracting light pieces of iron or steel.

Magnet limbs.—See Magnet core.

Magneto.—A magneto-generator and a magneto-bell.

Magneto-bell.—An electric telephone call bell in which the armature of the electromagnet employed consists of a permanent magnet, so as to enable it to be operated by alternating currents.

Magneto-board.—The operators' switchboard used in a magneto-call system.

Magneto-call system.—A telephone system in which the talking current is obtained from a primary battery at each subscriber's instrument, and the calling and clearing-out signals in the exchange are operated by current from a small magneto-generator driven manually by the subscriber.

Magneto-generator.—A hand-operated dynamo-electric machine for generating an alternating current by the rotation of a coal of wire near the poles of a compound horseshoe magnet.

Magnet pole.—One of two points of maximum intensity of magnetic force.

Magnetic yoke.—The soft iron bar permanently joining the cores of an electromagnet.

Main cable.—See Feeder cable.

Main distributing board.—An iron frame on which the line cables are connected to the switchboard cables through heat coils and carbon plate arresters.

Manholes.—Vaults of brick or concrete constructed at intervals along a conduit for the introduction, rearrangement, removal, or distribution of underground circuits.

Manual signal.—A signal which after being displayed has to be restored to its normal position by hand.

McIntire sleeve.—A device consisting of two copper tubes brased together, and used for connecting line wires by running the extremities of the wires into the tubes and twisting the tubes about each other.

Meghom.—One million ohms.
Message.—The signaling of the central office, and the conversation which follows between two subscribers.
Message rate contract.—A formal agreement between the telephone company and a subscriber, whereby the latter is limited to a certain number of messages per year for which he pays a fixed sum.
Messenger wire.—A steel wire cable fastened to the cross arms, or to short iron arms attached directly to the poles, for the purpose of supporting an aerial telephone cable.
Microfarad.—One-millioneth of a farad.
Microhm.—One-millioneth of an ohm.
Mil.—One-thousandth of an inch.
Milliampere.—One-thousandth of an ampere.
Mirror galvanometer.—See Reflecting galvanometer.
Monitor.—A person who supervises the work of the subscriber operators by listening in on their connections.
Motor.—A dynamo-electric machine for transforming electrical energy into mechanical energy.
Motor-generator.—A dynamo-electric machine consisting of a motor and a generator whose armature shafts are directly connected together.
Mouthpiece.—That part of a transmitter into which are directed the sound waves of the voice.
Multiple-bridging switchboard.—A multiple switchboard in which the subscriber's jack at each section is bridged or shunted across his line.
Multiple connection.—See Bridging connection.
Multiple jacks.—Jacks enabling each operator on a multiple switchboard to connect with any subscriber's line, but which have no signal attached; they may be either subscriber's multiple jacks or out-trunk multiple jacks, depending on whether they are connected to subscribers' lines or to outgoing trunk lines.
Multiple-series switchboard.—A multiple switchboard in which the subscriber's jack at each section is in series with his line.
Multiple switchboard.—An operators' switchboard on which the terminals of each subscriber's line are repeated, or multiplied, a sufficient number of times that a pair of these terminals are within easy reach of each operator stationed at the board.
Mutual induction.—Induction taking place between two separate conducting bodies or circuits which are parallel to each other.

N

Negative element.—That element of a primary cell into which the current passes from the exciting fluid; the element to which the positive conductors or electrode is fastened.
N H_4 Cl.—See Sal-ammoniac solution.
Noise.—See Cross talk.
Noisy line.—A telephone line in which there is cross talk.
Non-selective party line system.—A party line system in which none of the subscribers connected to a line can be signaled by the operator, nor the operator by any one of the subscribers, without ringing each of the subscribers' bells.

O

Ocean telephony.—The process by means of which telephonic communication may be established across the ocean.
Office manhole.—A large manhole in close proximity to the central office, and into which the whole conduit system converges to be led into the office through the cable entrance.
Ohm.—The unit of resistance, it being that resistance through which 1 ampere of current will flow at a pressure of 1 volt. One ohm is the resistance, at the freezing point, of a column of mercury 106.3 centimeters in length and weighing 14.4521 grams.
Ohmic resistance.—See Resistance.
Ohm's law.—The current strength in amperes varies directly as the electromotive force in volts, and inversely as the resistance in ohms.
One, two, three, four, five, or six point jack.—A jack containing one, two, three, four, five, or six contacts or conductors.
Open circuit cell.—A primary cell subject to polarization, and which therefore must not be left connected in a closed circuit when not in use.
Open wire line.—A telephone line in which each conductor is wired to insulators that are mounted on cross arms supported by line poles.
Operating room.—That room in which is located the operators' switchboard.
Operators' circuits.—Circuits terminating in plugs, and used by telephone operators in the performance of their duties.
Operators' load.—The number of telephone messages handled by one operator in a day's work.
Operators' switchboard.—A board located in the exchange and equipped with the necessary apparatus to enable telephone operators to answer subscribers' signals, connect them together so that they may converse with each other, and disconnect them when their conversation is completed. Operators' switchboards are classed as transfer switchboards or multiple switchboards.
Order wire key.—The key by means of which an operator connects herself with an order wire.
Order wires.—Circuits running between the operators to enable them to talk with each other when necessary to give information for the proper performance of their duties.
Originating board.—See A-board.
Originating office.—The exchange central in that district from whence a call originates.
Outgoing trunk line.—A trunk line over which messages are transmitted.
Overhead cable.—A rubber insulated telephone cable designed for overhead transmission.

P

Paper insulated cable.—A lead covered telephone cable in which the individual conductors are insulated with paper tapes.
Paper sleeve.—A tube of paper placed over each joint made between the conductors of two cables.
Party line instrument.—A telephone instrument designed for operation on party lines.
Party line system.—A telephone system by means of which two or more subscribers can obtain service over a common line.
Pay station contract.—A formal agreement between the telephone company and the proprietor of some public building, whereby a telephone is installed in the premises and the proprietor allowed a certain percentage on each call sent in over the same after a certain number have been recorded.
Peg count.—The process of counting the local calls received by a central office during any 24 hours, to determine the load on the office.
Permanent magnet.—A magnet capable of retaining its magnetic properties for a long time.
Pilot relay.—A relay serving as a general guard to a number of signals, by indicating when any one of them fails to operate.
Pine tubing.—A creosoted wooden tube made in sections for underground conduit.
Plug.—A small brass rod formed to fit a jack, and used to make connection between the jack and a flexible wire cord.
Plugging in.—The act of inserting a plug into a jack.
Plunge battery cell.—A primary cell in which one or both elements may be withdrawn from the exciting fluid, to render the cell inoperative.
Polarization.—The collection of hydrogen gas on the surface of the negative element in a primary cell.
Polarized bell.—An electric bell used as a selective signal in party line systems; the bell has its armature or magnet core or both permanently magnetized, so that the armature normally occupies a certain position with respect to the cores and thereby enables the bell to be operated by pulsating currents of one polarity but not by pulsating currents of the opposite polarity.
Pole brace.—A rigid piece of timber used to hold a telephone pole firmly in place.
Pole fittings.—The cross arm braces, pole steps, guards, bolts, screws, etc., used on a pole.
Pole line.—An overhead telephone conductor or conductors supported by poles.
Pole piece.—A mass of soft iron connected with the pole of a magnet to concentrate and direct the magnetic lines of force.
Pole steps.—Iron drive screws or brackets fastened on the sides of a pole to afford easy access to the line wires.
Porous cups.—Unglazed earthenware cups used in certain primary battery cells to separate the exciting fluids.
Portable telephone set.—A light, compact, water-proof set consisting of a transmitter, receiver, magneto-generator, and magneto-bell. The set is provided with a strap, so that it may easily be carried from place to place by a wireman when repairing defects on the line.
Position.—That portion of a telephone switchboard occupied by one operator. Positions are classed as A-positions or B-positions.
Positive element.—That element of a primary cell from which the current passes into the exciting fluid; the element to which the negative conductor or electrode is fastened.
Pot-head.—A cable terminal used for the purpose of making an air-tight joint, and consisting of a lead sleeve somewhat larger in diameter than the cable sheath to which it is soldered.
Pot-head cable.—A flexible lead-covered telephone cable which is spliced to the main cable at the exchange entrance.
Power plant.—The permanent apparatus installed in an exchange to generate or transform electricity and supply it to the telephone switchboard.
Power switchboard.—A board on which are mounted voltmeters, ammeters, rheostats, fuses, and switches to measure, regulate and control the current in the various circuits.
Power wires.—See Battery wires.
Pressure.—See Voltage.
Primary battery cell.—A battery cell used as the original source of an electric current.
Primary circuit.—The circuit of which the primary winding of an induction or a transformer forms a part, and in which is connected the source of the current.
Private exchange.—A branch exchange having no trunk line connections with a central office.

Private line.—A telephone line running between two or more subscribers, but which is not employed for exchange service.
Protective apparatus.—The devices employed in exchanges and substations, or on the lines, to guard against injury from abnormal currents.
Pulley.—A flat-faced wheel mounted on the shaft of a machine, and driving or being driven by a leather belt.
Pulsating current.—An electric current varying in strength but flowing in one direction.
Punching.—See Clip.

R

Raising a subscriber.—Ringing a subscriber's bell until he answers.
Ratio of transformer.—The relation between the value of the voltage across the primary winding and that of the voltage induced in the secondary winding.
Reactance.—That component of the resistance in an alternating current that does not reduce the current, but which causes a difference of phase between the current and electromotive force.
Receiver.—The device used by a telephone subscriber for receiving conversation from a distant party.
Receiver cap.—The hard rubber cap which is screwed to the case of a telephone receiver and holds the receiver diaphragm in position.
Recorded connection.—A telephone connection made between two persons in which the number of the subscriber or name of the person calling, and the number of the subscriber called, are written down by an operator.
Reflecting galvanometer.—A galvanometer in which the movements of the magnet are shown by the movements on a graduated scale, of a ray of light reflected from a mirror mounted upon the magnet.
Relay.—A device consisting of an electromagnet, which when excited attracts a movable armature and thereby completes an auxiliary circuit.
Reluctance.—See Magnetic resistance.
Repeating coil.—An apparatus used to repeat electric impulses of one telephone system into another telephone system, and consisting of two coils of insulated copper wire on an iron core, each of the coils being wound with the same number of turns and to the same resistance.
Resistance.—That property which a body possesses for limiting the strength of an electric current.
Retardation coil.—A coil of insulated wire designed to offer a large inductive resistance to an alternating current.
Reverse call circuit operator.—See Circuit trunk operator.
Rheostat.—An instrument for introducing into a circuit an adjustable or variable resistance of known amount.
Ring-down trunk operator.—A trunk operator on a transfer switchboard who receives the subscriber's call, through the subscriber operator, over a common trunk line which terminates in a magnetic drop in the trunk operator's section.
Ringer.—See Magneto-bell.
Ringing generator.—An electric generator in the exchange supplying alternating current with which to operate the subscribers' bells.
Ringing key.—A key used by the operator in placing current on a line to ring a subscriber's bell.
Ringing off.—The act performed by a subscriber when operating his magneto-generator to throw the clearing-out signal in the exchange.
Rocker arm.—An iron frame mounted on the bearing of a dynamo-electric machine for supporting and moving the brush holders and brushes around the commutator.
Rodding.—The process by means of which a fish wire is threaded through a duct.
Rubber insulated cable.—A telephone cable in which the individual conductors are insulated with rubber.
Running board.—An inferior type of distributing board, generally constructed by mounting connectors on wooden strips fastened to the lower part of the operators' switchboard.

S

Sag.—See Dip.
Sal-ammoniac solution.—The solution used in a Leclauché cell, and made of a white, vitreous, soluble ammonium chloride and water.
Saturated core cable.—A cable in which the core is saturated in paraffin for the prevention of moisture.
Secondary cell.—See Storage battery cell.
Secondary circuit.—The circuit of which the secondary winding of an induction coil or a transformer forms a part, and in which current is induced by that in the primary winding.
Selective party line system.—A party line system in which there is selective signaling.
Selective signaling.—That arrangement by which any one of the subscribers connected to a line can be signaled by the operator, or the operator by any one of the subscribers, without ringing the bells of the other subscribers on the line.
Selective system.—A telephone system in which each incoming call is received by one operator who switches the same into that section of the switchboard which appears the least busy.
Self-restoring drop.—See Automatic signal.
Series bell.—The magneto-bell used in the subscriber's instrument for a series connection.
Series connection.—An arrangement of sources or utilizers of electricity formed by connecting the positive terminal of one to the negative terminal of another, so that the current passes through each in succession.
Series generator.—The magneto-generator used in the subscriber's instrument for a series connection.
Service connections.—See Drop wires.
Setting the poles.—Placing poles in the proper positions for supporting a telephone line.
Short-circuited wire.—A wire which, by coming in contact with a conductor, forms therewith a shorter path for the current than originally existed.
Shunt.—The formation of an additional path for the passage of a current.
Shunt wound motor.—A motor having its field magnet winding connected as a shunt across the external circuit.
Signal.—A device for attracting the attention of a telephone operator, or of a telephone subscriber.
Signaling circuit.—The circuit in which either the operator's signal or the subscriber's signal is connected.
Signaling current.—Current used in signaling either the telephone operator or the subscriber.
Signal trunk operator.—See Ring-down trunk operator.
Simple bracket.—A wooden support mounted directly on the telephone pole for holding an insulator.
Simple pin.—See Cross arm pin.
Single fluid cell.—A battery cell in which but one exciting fluid is employed.
Sizzling.—The nature of the sound heard in a telephone receiver when too strong a talking current is employed.
Slide wire bridge.—An instrument used in measuring resistances when their values are less than 2 or 3 ohms.
Sneak current.—A current in a telephone circuit caused by leakage from a power or lighting system. A sneak current derives its name from the fact that it sneaks past the protective fuse.
Span.—The distance between the supporting insulators on adjacent poles of a line wire.
Sparking.—The formation of sparks between the brushes and commutator of a dynamo-electric machine.
Specific gravity of a solution.—The weight of a given volume of the solution compared with the weight of an equal volume of water.
Splicing cables.—Joining the individual conductors of two cables.
Spring jack.—See Jack.
Standard condenser.—A condenser whose capacity is known, and which is used as a standard for comparison in making capacity tests.
Storage battery cell.—A cell usually composed of lead plates immersed in a sulphuric acid solution. A current from an external source passed through the cell affects the positive and negative plates differently, so that when this current is stopped and the proper connections made, the plates behave like different metals and develop a current in the opposite direction to that of the current at first passed through the cell.
Storage cell capacity.—The ability of a storage battery cell to receive or furnish electricity. Storage cell capacity is expressed in ampere-hours, and depends upon the design of the plates or elements used in the construction of the cell.
Stringing the wires.—Tying the conductors of a telephone line to the insulators.
Stripping trunk line.—A circuit extending between two non-adjacent telephone operators on a transfer switchboard, to enable them to make connections with subscribers' jacks not located in their respective sections.
Subscriber operator.—A telephone operator who receives calls and makes connections for local subscribers.
Subscribers' board.—See A-board.
Subscriber's circuit.—See Local circuit.
Subscriber's instrument.—The entire talking and signaling apparatus used by the subscriber; this consists of a receiver, transmitter, call bell, and means of signaling.
Subscriber's line.—A wire, or pair of wires, used to supply telephone service to a subscriber.
Subsidiary cable.—See Lateral cable.
Sub-station.—This term is used to designate the location of a subscriber's telephone instrument; it is also used to denote the entire apparatus necessary for a telephone subscriber.
Sub-station protection.—The carbon plate arresters, heat coils, and fuses.
Subway line.—See Underground line.
Sulphating of plates.—The formation of a white deposit on the plates or elements of a storage battery cell.
Sulphuric acid.—A colorless, corrosive, oily liquid compound used largely in battery cell solutions.
Sulphuric acid fumes.—The vapors arising from a sulphuric acid solution.

Superintendent of construction.—A person having supervision of all work done outside an exchange.

Supervising a connection.—The act performed by a telephone operator in connecting her head receiver with the circuit of two subscribers, for the purpose of determining whether they have begun talking or whether they have finished.

Supervisor.—See Monitor.

Supervisory relay.—A relay controlling the operation of a supervisory lamp.

Supervisory signal.—See Clearing-out signal.

Supervisory system.—See Automatic signaling system.

Supply mains.—The conductors carrying the main supply of current.

Switch.—A device consisting usually of one or more pivoted metal bars for making or breaking a circuit, or for transferring a current from one circuit to another.

Switchboard.—See Operators' switchboard.

Switchboard cable.—The telephone cable running between the main distributing board and the operators' switchboard.

Switchboard face.—That part of a telephone switchboard which faces the operator when performing her duties, and upon which are mounted the signals and jacks used in the system.

Switchboard panel.—A strip, usually of hard rubber, mounted on the face of the operators' switchboard and containing the signals or jacks used in the system.

Switchboard section.—That portion of an operators' switchboard containing the entire apparatus provided for one operator.

Switchboard shelf.—A projection on the operators' switchboard upon which rests the plugs when not in use.

T

Tachometer.—An instrument used for measuring, in revolutions per minute, the speed of the armature shaft in a dynamo-electric machine.

Taking down a connection.—Removing a telephone connection on the operators' switchboard, between two parties who have been conversing.

Taking up a subscriber.—The act performed by a telephone operator in learning from a subscriber the connection he desires.

Talking circuit.—A telephone circuit through which passes the talking current.

Talking current.—See Telephonic current.

Tape.—An insulating braid used in wrapping conductors to prevent a leakage of current.

Target shutter.—See Automatic signal.

Telephone.—See Receiver.

Telephone booth.—A sound-proof enclosure provided with a telephone set.

Telephone center.—That point within a district from which the sum of the distances, measured along streets, to all the subscribers' instruments, is a minimum.

Telephone engineer.—A person who plans the construction of the exchange and its equipment, together with the construction and equipment of the line circuits.

Telephone hook.—See Hook switch.

Telephone operator.—A person employed by a telephone company for the purpose of establishing connections.

Telephone switchboard.—See Operators' switchboard.

Telephone system.—The arrangement and connection of electrical apparatus for providing telephone service to the public.

Telephonic current.—The current used in transmitting the sound waves of the voice.

Telephony.—The process of reproducing articulate sounds at a distant point by the transmission of electric impulses.

Tension dynamometer.—An instrument used for measuring the tension given a line wire in stringing it.

Terminal.—A connecting device used in joining different pieces of apparatus or types of conductors.

Terminal pole.—A wood or iron pole carrying a cable head, at which an overhead cable terminates.

Territorial exchange.—A number of exchanges and connecting toll lines controlled by one telephone company.

Tie wire.—A short length of wire, preferably of the same material as the line wire but somewhat smaller in diameter to afford flexibility, which is used to tie the line wire in the groove of the insulator.

Timed connection.—A telephone connection made between two persons, in which the exact time the conversation is commenced and that at which it is finished, are written down by an operator.

Toll board.—A telephone switchboard usually placed in the exchange nearest to the territory covered by the toll circuits, and containing the jacks for incoming and outgoing trunk lines together with the toll operators' connecting circuits.

Toll circuit.—A trunk circuit extending between distant exchanges, for the use of which an extra rate is charged the telephone subscriber.

Toll operator.—A person who handles telephone connections between distant exchanges.

Transfer switchboard.—An operators' switchboard on which there is but one pair of terminals for each subscriber's line, and each operator who desires connection with a subscriber's circuit whose terminals are not within her reach, must transfer by means of a stripping trunk line the message to the operator before whom these terminals are located.

Transformer.—A device constructed similarly to an induction coil, and by means of which the voltage of an alternating current may be increased or diminished.

Transmitter.—The device into which a telephone subscriber speaks when talking to a distant party.

Transmitter arm.—An adjustable metal arm upon which the transmitter is mounted.

Transposition.—An arrangement of the conductors of an open wire line for preventing cross talk. The conductors of each metallic circuit are interchanged at frequent intervals along the line by wiring them to opposite insulators, so that the inductive disturbances in one conductor are neutralized by those in another circuit.

Transposition insulator.—A two-part glass insulator used when making transpositions.

Trench.—A long, narrow excavation in the ground for holding telephone conduits.

Trouble.—Any defect or difficulty that occurs in telephone circuits or apparatus.

Trouble clerk.—A person who records and tests all cases of trouble that arise in the wire plant.

Troublemen.—Men employed to hunt for, and remove defects that occur on telephone lines.

Trunk circuit.—A telephone circuit between two neighboring exchanges, which is used in placing subscribers connected to these respective exchanges, in communication with each other.

Trunking board.—See B-board.

Trunk jack.—A jack in which a trunk circuit terminates.

Trunk operator.—A person who receives calls and makes connections for telephone subscribers local to other offices.

Turnbuckle.—A form of coupling connected lengthwise in a guy wire, for the purpose of taking up the slack that generally occurs from time to time.

U

Underground cable.—A paper or rubber insulated telephone cable with a lead sheath, designed for underground transmission.

Underground line.—A telephone cable line laid in an underground conduit.

V

Variable resistance.—See Rheostat.

Varley loop test.—An accurate and convenient method for locating grounded, crossed, or swinging telephone conductors in open wire or cable lines.

Visual signal.—See Magnetic drop.

Vitrified tiling.—Short lengths of glazed earthenware pipe used in forming an underground duct.

Voltage.—The pressure, in volts, tending to force a current of electricity through a conductor.

Voltmeter.—An instrument for measuring, in volts, the pressure of an electric current.

W

Wall plugs.—Wooden pegs inserted in holes which have been drilled into the wall of the subscriber's premises, for supporting his telephone instrument.

Wall set.—A subscriber's complete telephone instrument so mounted that it may be supported by the wall.

Watt.—The unit of electrical power, it being the energy contained in a current of 1 ampere with an electromotive force of 1 volt.

Watt-hour.—Electrical energy capable of producing 1 watt for 1 hour.

Wattmeter.—An instrument for measuring, in watts, the rate of doing electrical work.

Wheatstone bridge.—An instrument used in measuring resistances when their values are above 2 or 3 ohms.

Wire chief.—A person having charge or supervision of the power plant, switchboard, and house wiring; also of the line wire and cable testing.

Wire chief's desk.—A table equipped with the necessary apparatus for testing, locating, and clearing trouble that arises in the telephone system.

Wire fence line.—A telephone line across country, formed by the iron wires composing a fence.

Wireless telephony.—The process of reproducing articulate sounds at a distant point, by the transmission of electric impulses conductively through the earth or water between parallel grounded circuits, or inductively through the air between parallel complete metallic circuits.

Wire plant.—That portion of a telephone installation which furnishes electrical connection between the subscribers' instruments and the main distributing board in the exchange.

Y

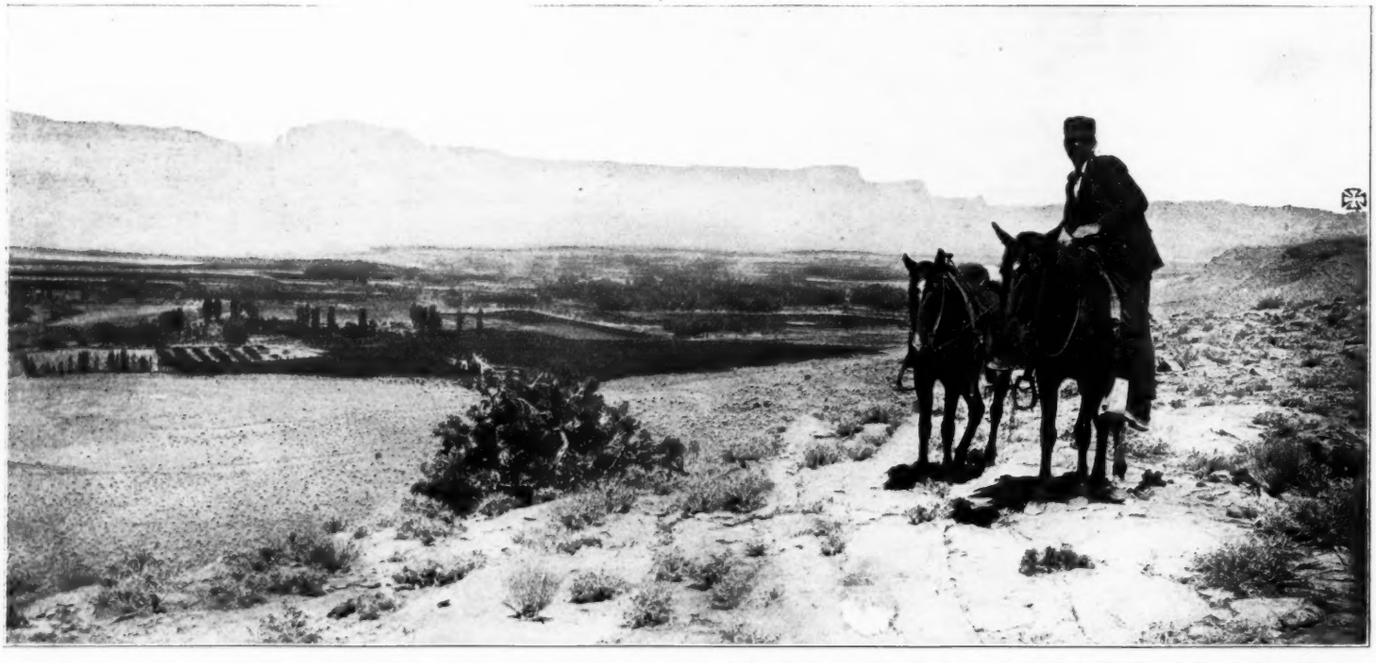
Y-splice.—The division of a feeder cable into one or more branch cables, the splice being covered by lead sleeves soldered to the cable sheaths and forming a Y.

MORE TELEPHONING IN "THE COUNTRY GOD FORGOT."

An Interesting Description of how a Telephone Line was Constructed over La Sal Mountains

By J. N. Corbin

THE rapid extension of the telephone in the east and middle west rural districts, of which TELEPHONY gives its readers so much information each month, is marvelous, but when it is considered that there are prosperous farmers living along every mile, the advantage both to the investor and the subscriber are easily made apparent. But the extension is also going on in the broken mountainous country of the wild west, where these advantages are not to be so easily seen, and over places where the experienced eastern telephone manager would look with wonder, if not horror. It is "telephony in the country God forgot," as shown in the February issnue of TELEPHONY. The government is finding it necessary to push out lines into such places. It can afford to pay for it. Running wire over miles of uninhabitable mesas of rock and sand, along the brink of canyons a thousand feet deep, and dropping it over clifts 1,500 feet to the valley below, to connect two hamlets of a total population of less than 700, has not the advantages to give it attraction, at least from the investor's standpoint. The capitalist shakes his head and the native says: "I guess we've got along without it so long, we can a spell longer." But such a line exists in southeast Utah, near the border line of Colorado, and its construction crew is shown in the accompanying illustration, three western ponies and one man. The pony standing nearest the man is "Old Hammer," a noted buckskin cow pony, now twenty-nine years old, and known among the old-time cowmen of the intermountain country from the Arizona-New Mexico line to Wyoming. Of his intelligence and traits much might be written. He was used in snaking poles and wire by the horn of the saddle in places the other horses would not work.



Moab Valley, Utah, Looking Northwest to La Salle Mountains. The La Sal Telephone Line Goes up the Cliff at ✠. Mr. J. N. Carbin, Manager of the Company is Seen in the Foreground.

Moab is the county seat of Grand county, Utah, situated in a fertile valley (in reality an enlarged box canyon) in the southern part of the county, and about thirty-five miles south of the Rio Grande railway. It has a population of about 600, extending over an area about three miles wide and eight miles long. Moab valley runs from Grand river twenty miles southeast to the south end of the La Sal mountains, whose snowy peaks loom up above the valley seven to nine thousand feet and eleven to thirteen thousand feet above sea level. To the northeast lays Castle valley, similar to Moab valley, but ending at the north end of the mountains, and runs parallel with it. Castleton is a hamlet of eight or ten families, lying where Castle valley butts against the mountains. It is a promising town site when the prospective mineral developments of the mountains become a certainty. An air line between Moab and Castleton is less than thirteen miles, but by the nearest route a horse can travel it is twenty-eight miles, and in the winter time thirty miles.

In the spring of 1898 a stranger drifted into Moab and succeeded in raising local capital sufficient to build a telephone line thirty-five miles long, from Moab to Thompson. This is an all pole line running up the canyon onto the intermountain desert and crossing it. This was a long step toward civilization for this country. In the spring of 1903 I urged the building of a line to Castleton connecting the principal valleys of the county, and finally organized the La Sal Mountain Telephone and Electric Company, with an authorized capital of $6,000. I had lots of promises of labor help to be paid in stock, but succeeded in getting in about $150 in cash; with this I ordered two telephones from the American Electric Telephone Company, Chicago, and

fifteen miles of wire, brackets, insulators and some needed tools. Then came trouble; no labor help came. I had to do it myself. I cut the poles on the mountains and dragged them down to wagon roads and got them hauled when I could, or snaked them with my saddle horses.

The line leaving Moab mounts a clift rising about 600 feet above the town. On the face of the clift are projecting reefs of rocks. Here I made the hitches on iron, taking three-quarter-inch iron rod in pieces about twelve inches long, to which I welded pieces of old wagon tire, and to that riveted common pole brackets. Holes were drilled into the rock and these set in with cement. The region to be crossed allow a horse and rider to pass under the wire, in such places a pole was set of sufficient height.

A narrow canyon breaks through the mesas, following the direction of the two valleys, and is from 800 to 1,500 feet deep. I followed along the brink of this canyon for about four miles, setting the wire entirely on trees and rocks. This canyon closes up about one-half mile from the clift, dropping into Castle valley. At the clift, instead of taking a sheer drop of a thousand feet, a break was found near the geographical line we were following where crags had been formed, on which grew pinyon trees. From a tree overhanging the clift we dropped down from crag to crag

In the Illustrations 1 Shows "Balanced Rock," 2 The Construction Crew, 3 and 4 Views in Castle Valley. The Maltese Crosses Show the Route of the Telephone Line. In the Center is a Portrait of J. N. Corbin, Manager of the La Salle Mountain Telephone and Electric Company, Moab, Utah.

to Castleton is a series of benched mesas (tablelands) badly broken with canyons, and rising about 4,000 feet above Moab and about 8,000 feet above sea level. Castleton has an elevation of about 6,000 feet. This mesa brakes abruptly off into Castle valley over a clift 1,500 feet above the valley. The accompanying illustrations give some idea of the route and the clift. Reefs of rocks were followed in crossing the mesas, as my style of iron poles were cheaper and better than any other at hand. In one place no poles are used; the wire swings between the tops of rock butts 200 feet above the trail below. In many places cedar or pinyon trees came into use, and if a tree were not tall enough to and tree to tree, making many more hitches than usual in a straight line, some places wiring to the rock, using rope to work down on. A photo of this place would be interesting, but it could not be procured. Any of these canyon breaks must be seen to be understood. All of this line, except the four miles in canyon and over clift, I built with horses only to assist me. A horse could not be worked in the canyon, except to pack material to convenient places, as scrub trees, rocks and fissures are constantly encountered. As I worked it a reel was set up at a convenient point, a lariet rope was woven into the end of wire, and the rope was thrown over trees and the wire drawn through.

I could get out about one-third mile of wire this way without cutting it.

When the line was completed a telephone was set up at Castleton and one in my office at Moab. A toll rate of fifty cents was established. It was not long before ranchers seven miles down Castle valley wanted a line built, and as they brought the poles needed I built the line. The line to the railroad had not been paying its owners, and they leased it for a term of years to our company, we paying them ten per cent on their capitalization. I at once put it in working order, and we have had no reason to complain of our bargain. We have a local exchange at Moab of sixteen telephones and eight telephones on the toll lines to Thompson and Castleton. We expect to run the line this summer across the La Sal mountains at an elevation of 11,000 feet, into Colorado, passing Mt. Tamasaki mining camp. Our lines were opened for business on August 27, 1903, and the original stockholders received one-third of their investment in dividends. We have had no trouble in maintaining the line, though during the winter a mile of the line just before it goes over the cliff is buried in snow, and has been each winter since built. The system works

The General Offices of the Company.

just as well when the wire is buried in snow. At present, H. G. Green, a local stockman, is our president, my daughter Emma E. Corbin, is secretary, and I am the manager of the company.

THE MANUFACTURE OF TELEPHONE CABLE.

With the rapid growth during recent years in the use of underground telephone cable, the manufacture of this commodity has developed into a highly important industry, says Modern Machinery. In cable manufacture great care must be exercised in handling the raw material in order to prevent any mechanical injury. Especially is this true of the bare copper wire, since the slightest abrasion of the surface of the wire tends to materially decrease the tensile strength of the wire at that point.

The initial operation in the manufacture of telephone cable is the insulating of the single conductor. This is done by horizontal machines, the wire being fed from coils into the machines by special unreeling drums. It passes through two heads set in line and revolving in opposite directions, each of which winds one "wrap" of paper spirally on the wire. This provides a double wind of paper, so arranged that at any point there are four thicknesses of paper between the wire and the outside of the insulation. Great care must be taken in joining the wires, all joints being brazed with pure silver solder by experienced braziers, in order that the workmanship may be such as to give the joints greater breaking strength than the wire itself.

In the insulation of the wires it is arranged that one of each pair of wires shall receive two wrappings of gray paper, while the other receives two wrappings of red paper. The reason for this is found in the next operation, when the two wires are twisted together to form a pair, the distinctive color paper clearly indicating the individuality of each wire in the pair. After the wires have been twisted in pairs they are placed on core machines, where they are laid up so as to form the cable core.

The core machines consist of a series of drums, on the periphery of which there are set a number of spindles, such as will receive the spools of twisted wires. The pairs of wires on each drum are led through a mouthpiece in the forward end of the drum and into the rear of the drum immediately preceding it, and so on through the drums. The drums are revolved simultaneously, but half the drums revolve in one direction, while the other half revolves in the other direction, and since each drum places one layer of pairs on the cable, we have at the end of the last drum a cable core which has alternate layers put on in one direction, while the intermediate layers are put on in the opposite direction. This construction produces a non-inductive core, and after the last layer is put on, the core is wrapped with one layer of heavy manila paper, which insures high insulation between the core and the sheath, and also protects the pairs from mechanical injury.

When this stage is reached the core is rigorously tested for "opens" and "crosses" by means of a head receiver and two dry cells. If the electrical tests demonstrate the core to be in satisfactory condition, it is ready to be dried—a very delicate process, which requires the services of an experienced man day and night. Indeed, it is the most critical point in the manufacture of the cable, since both the high insulation and low capacity of the finished cable depend largely upon its successful issue. The drying is done in ovens—large iron chambers, the temperature of which is carefully controlled by steam valves on the outside. Each of the ovens has a capacity for drying thousands of feet of cable core. After a quantity of core has been placed in an oven to be dried, the doors are closed and the temperature raised. After the core has become sufficiently hot, a vacuum pump is started and the air and moisture are pumped out of the chamber. This process is kept up until the cable core is perfectly dry, when the vacuum is broken by allowing dry air to pass in and be absorbed by the cable core.

Next comes the encasing of the core in its lead sheath, a very interesting process. It depends for its success upon a peculiar physical property of lead not generally known, which is that when lead is heated to within 75 or 100 degrees of its melting point it will, if subjected to enormous pressure, assume a plastic state and will become solid again as soon as the pressure is removed. Thus, when melted lead is put in the cylinder of the lead press and allowed to cool, and then subjected to enormous pressure, it assumes a plastic state, and is forced out around the cable core, and thus out of the press into atmosphere, where the lead assumes a solid state and there forms a continuous sheath around the cable.

After the cable has been tested and has successfully passed its final inspection, the test ends are cut off, two feet having been allowed on each length for this purpose when the core was made. The ends are then sealed with solder and bound securely to the sides of the reel with wire, thus insuring against loose ends or injury from such cause during shipment. The reel is now lagged up and the lags bound on securely with twisted iron wire along their ends and completely encircling the reel. The reel is now ready to be placed aboard the railroad car that is to convey it to the consumer. Whereas, the industry of telephone cable manufacture was only established in 1881, millions of dollars are now invested in plants manufacturing this product.

HUMOROUS TELEPHONY

Stories and Anecdotes in a Lighter Vein

THE telephone now has a new use. It has become a mind reader and may yet puzzle men into paresis. Bolognesi, Hartfield & Co., 29 Wall street, are about as well known as any bankers in New York. When a Wall street man wants relief from mental strain he invents a new gambling device or perpetrates a joke. William Hartfield caught several friends in the Stock Exchange the other day and suddenly broke out with: : "By the way, do you fellows know that the telephone is doing mighty stunts just now? Why, it can tell exactly what you are thinking about! Don't believe it? Well, just put your mind on a certain card and do some hard thinking. The wire will do the rest."

The great majority of men, being curious, will "bite." Captain Casey (of Casey at the Bat) was the first willing victim. "I'm thinking of the ace of diamonds," he said. "All right," replied Hartfield; "just call up 1111 Morningside and ask for Sanderson and tell him you have something on your mind." Casey called. "Hello! Is that Sanderson? Yes? Well, I've got something on my mind." Sanderson's voice came back—"It's the ace of diamonds; good-by." It cost Casey nearly a day's profits in Steel. Jack Cooper was asked to think of a card. "The deuce of spades." "All right; call up 2222 Broad and ask for Burrill and tell him you have something on your mind." Cooper called. "Hello, is that Burrill? Yes? Well, my name is Cooper; I have something on my mind." "I know," said Burrill; "it's the deuce of spades." Collapse of Cooper.

I assume that the trick is 1,000,000 years old to some of the smart alecks who know everything before it happened. But it is most amusing and confusing. Until let into the secret you never would or could guess the modus operandi. Like all other things in life, when you understand thoroughly it is simplicity itself. Fifty-two jolly chaps who rent telephones have entered into a compact. Each represents a certain card in the ordinary deck of fifty-two, and each of the conspirators carries in his pocket a printed guide to all of the subscribers. For example: Upjohn, 3333 Cortlandt (of course, I am using fictitious addresses), is the king of hearts; Billtow, 4444 Franklin, is the ten of clubs; Calbach, 5555 Gramercy, is the five of diamonds, etc.

Hartfield, let us say, after learning that Hooper Jones has selected the king of hearts, surreptitiously glances at the printed guide in his pocket, instructs Jones to call up "Upjohn, 3333 Cortlandt," and say he has something on his mind. Of course Upjohn replies without hesitation, "Oh, yes; I know; the king of hearts." And the victim is lost in wonderment. The chief operator in the joke has a lot of fun; but who are these amiable fellows who do not mind being called up a dozen or a hundred times a day as a mild joke?

During the course of our daily routine in this office we have occasion to talk over the telephone just about forty or fifty times a day to as many different people, says the Hudson (N. Y.) Journal. It may be our fault and it may not be, but it is a cinch that some of us don't know how to manage the machine. It usually happens this way. We sit at the desk with our brows drawn in deep and penetrating thought—trying to bisect the angles of a hydrant, or draw smoke through a stopped up pipe. There is a violent ringing of the telephone bell which would make your hair curl; we make a dive for the receiver and with a scowl say pleasantly:

"Hello."

"B-m-j-ll-ky-cz," comes the answer, as though the victim on the other end were talking from a dentist's chair and had a file, a drill, several sheets of rubber and an ulcerated tooth in his mouth. Again we scowl and say pleasanter than before: "No he isn't here to-day. He'll be in the first thing in the morning." Or we take a chance and say, "It will cost you twenty-five cents an insertion."

"X-yl-k-m-u-gg-sqpvzy," says the other end, and we hang up the receiver convinced that we have done about fifteen dollars' worth of business and reduced our stock of patience fifty per cent. We'll be willing to gamble, and take the short end of it, too, that Job never had a telephone in his office. Now, if all would talk like the charming young ladies at central, all would be well, but they don't. May we offer a few hints for making yourself perfectly plain over the 'phone?

If you are near the larder, run and get a big mouthful of cake or pie before you start to talk. You will find that it will facilitate matters greatly.

If the larder isn't convenient, stick your nose in the transmitter and yell at the top of your lungs into your vest pocket. Of course, the man on the other end can't hear you, but think what a lot of fun you are having yourself.

Another good way is to get as far away from the transmitter as possible and talk as though you were in the last stages of consumption, or were dying of locomotor-ataxia in your thorax.

Don't on any account get a reasonable distance away from the transmitter and speak your words clearly and distinctly, for in that case someone might be able to understand you, which is not the end to be desired at all.

The Telephone Trust, which should know what it is talking about, is endeavoring to save us the trouble and expense of subscribing to a rival concern. It cites instances and authorities to prove that two or more telephone systems in a town is not competition but duplication, says the New York World.

Read what the Hon. Chancey De Phew! has to say about duplicate systems:

Gents: Received your inquiry as to whether telephone competition in New York would not be a bad thing for your company and the enclosed retainer for a favorable reply. I accept the retainer and your views. Take my own case. I have a telephone in my house and have been much annoyed by impertinent persons calling me up and asking me why I do not resign. If I had two telephones in my house, I would have double annoyance. No, the present telephone system is bad enough, but we do not need another one.

CHANCEY M. DE PHEW!

Mr. Somthyng Justus Goode, the leading Harlem druggist, is a strong advocate of one flag, one wife and one telephone system, and that telephone system the one already installed—ours.

To our collector of pay-station tolls Mr. Somthyng Justus Goode said:

"I do the largest look-in-the-directory trade in Harlem, and for years my store has been the center of attraction for bargain-seekers who prefer to buy postage stamps at cost.

"I also keep a young man whom I thought I had hired to mix up prescriptions and officiate at the soda water foun-

tain, but his time is entirely taken up in climbing to top flats to ask ladies to come to the telephone.

"When the parties sent for come in my store and sit at the telephone desk I glean from their remarks that some friend downtown is telling them where they can buy toilet articles and moth balls cheaper than I can sell them.

"I also am annoyed by dozens of people who take advantage of the fact that I am busy telling people where they can find a policeman or distributing patent medicine almanacs to school schildren to remember to forget to pay me for using the telephone. As all tolls are charged to me, I am decidedly against a rival telephone company, as with two telephone systems in my store my loss in time and money would be twice as much as it now is."

The following editorial from the Hay Corners (N. Y.) Weekly Enterprise shows how those fearless guardians of our civic liberties, the great newspapers, view a duplicate telephone system:

"The attention of our readers is called to the full-page ad. next to pure reading matter and patent medicine testimonials. This advertisement shows how the Telephone Trust has made talk cheap and how another telephone company in our town would be a great calamity. We have three telephones in town now, and that is enough. The town councils of Yaphank and East Malaria have agreed with each other that it would be against the interests of their communities to give another telephone company the privilege of stringing wires within their corporate limits. The report that rival companies have attempted to bribe our town councillors is false. Let them just dare to do such a thing and they will see if our town rulers will pocket the insult!"

Did you ever go to the phone in the biggest kind of a hurry, with——

The house on fire,

Or the hack overdue and the hands of the clock pointing to within ten minutes of train time,

Or unexpected company in the house and provisions short,

Or the baby with the colic,

Or something worse?

Did you?

And you turn the crank? And you wait? And continue to wait?

And Central—dear Central—begins to buzz "Number-umber-mber—number? What? Hello! Number—umber—b-z-z-z-zip ————?"

And all the while you are dancing up and down, trying to stave off an apoplectic stroke and shouting at the top of your voice the number you want?

And you wait? And wait? And keep waiting?

And bye and bye you ring again? And you get no reply, and keep whirling the crank until the axle smokes? And your head grows dizzy, and you stagger weakly against the wall, while your knees knock together and your parched throat begins to crackle like burning grass?

And just as you are about to butt your head against the wall you hear a voice—

A gentle, unruffled, softly inquiring mildly surprised and wholly melliloquent voice—

Saying,

"Did you ring?"

And then you give a maniacal laugh and faint?

Honest, now, did you ever?

Mr. L. E. Jeanin, superintendent of the Orlanda (Florida) Telephone Company, has received the following letter from a subscriber which is self-explanatory:

I suppose you are busy. My telephone now does very nice except that it has undergone another dissability. The bell sometimes it makes only the faintest kind of a noise; the bell apparently not sounding at all, and except that I am very near it, and understand only the click it makes I imagine that I do not hear it at all.

The above letter is not quite as amusing as the following two which were received by one of the large operating companies:

Gentelmens

I hat the hope wen you build youer line thru hir that you wood make a staceion in my hous but at looks to me if you wil not Mr. Overmiller tolt me wen he left hir that it woot be puty schure that whe wood have one Gentelmen I hat severl cals already but I has to tol them I got no instroment. I tink it wood pay hir becoss whe got no opereter hir Gentelmen I am a Goot frind off telefone and I wood youset Puttymutch for my own youse then I can talk to my Comision men in ton and then I wil take Car off youer line hir. I have seen often that sumting tiet on strings & trode over the line but I took it of. you fine mein boys all over the Cuntry and I wil make you the Prommis that i wil take car off youer line hir and i wil du all for you i Can if you wil put youer instrument in hir i tink it wil Pay for the Co. You must not only depant on wat maches going out hir you ato depand wat is coming in hir.

now Gentelmen I wrote you all about it and i hope you will put it in hir. it is onle a littel for youer Co. and I wil try all i can du for you and it wil be a Conwingeont to you that i wil look over youer line for a good distens. Gentelmen stude this over and i hope the were bast off it. Youers

ERNST SCHULZE.

Centelmen

I tank you for youer kind anser on my lather and if you wil put it in my hans I wil be were Carfule wit sat instrumint and Peers Postofis at Concodkil is the were Plase for same. it includs Hopwil, Charete and Peers station.

Peers Postofis at Concodkil the mittel off same but the Postmaster wil not be bodert wit same so my hous is yes the Plase for same wil it is the mittel off thim 4 touns. I dont leve at the station but I got the Grain Businis at the station but ouer Plase is the bast Plase. the station is to moutch on 1 side. Youers

E. SCHULZE.

"Gee whiz, isn't that fellow ever going to get through with that telephone? I've been waiting here about fifteen minutes."

"Who, that fellow over there? Just wait a minute. I'll fix him," said the drug clerk.

He disappeared behind the glass prescription partition and the little group of onlookers waited. Suddenly a look of pained surprise came over the face of the man at the telephone. The stream of light and airy persiflage he had been whispering to his "lady friend" suddenly ceased.

"Hello! Hello!" he called several times in anxious tones. Then he hung up the receiver and walked away. A moment later the drug clerk emerged from behind the counter, with a pleased look on his face.

"We have to do it," he said. "Some of these guys would stay on the telephone all night if we didn't cut 'em off. We simply cut the instrument off with a little switch behind the counter and there's nothing more doing."

Mr. Grunendyke looked at his watch, stepped to the telephone and called up his home in one of the suburbs eight or ten miles away.

After the lapse of a minute or two there came the response:

"Hello!"

"Hello!" said Mr. Grunendyke. "Is that you, Belladonna?"

"Yes. That you, Hiram?"

"Yes. Has the man come to fix the furnace yet?"

"No. You were to call me up at 2 o'clock and ask me that. It's only 1 o'clock now."

"I know it. I supposed, of course, I'd be the usual length of time in getting you."

George Y. Wallace, one of the best known residents of Salt Lake, tells this as the latest telephone story:

In a certain Western central office one "hello" girl was always late in arriving in the morning. Time and again

the manager had pleaded with her to be more prompt. Her tardiness continued until he was moved to desperate methods.

"Now, Miss Jones," he said one morning, as he came to her exchange with a package in his hand, "I have a little scheme which I hope will enable you to arrive at the office on time. Here is a fine alarm clock for you. Promise me that you will use it."

The young woman promised and accordingly set the alarm for the proper hour when she retired that night.

At 7 o'clock there was a tremendous whirring from the alarm clock.

The sleepy "hello" girl rolled over in bed and said sweetly and still asleep:

"Line busy; call again!"

"Is dis Miss Mandy Johnsing?" asked the voice on the telephone.

"Yas, dis is Miss Johnsing."

"Well, Miss Johnsing, I done called you to de telephone to inquire if you would marry me?"

"Marry you? *Marry* you? Ob course I'll marry you. What made you all think I wouldn't marry you? Ob course I'll marry you. Who is dis talkin', please?"

FIRST TELEPHONES IN EUROPE

Charles O. Harris, a Pioneer in Telephone Work, Introduced the Telephone on the Continent

By J. H. Shoup

IT ISN'T every telephone man, no matter how long he may have been in the business, who is called upon to install a system in the houses of royalty. There lives in Salt Lake, however, a man who, back in the early eighties, was sent across the sea by a New York telephone company, and who spent four years on the Continent installing the first telephones used in Europe, several of them being in the different royal palaces.

Charles O. Harris.

Charles O. Harris, local manager of the Utah Independent Telephone Company, has been in the business since 1877, or a year after the first system was installed in this country. In 1881 Mr. Harris, with a corps of other men, was sent abroad to introduce among royalty and the higher classes of Europe what was then looked upon as a new "toy." He spent four years on the Continent, two and one-half of which were put in in the realm of the Great White Czar, and it was in Russia that the telephone was received with the greatest favor.

Alexander III. was then the Czar of all the Russias. He became interested in the telephone as soon as it was explained to him and orders were given to have them placed in all the royal palaces. This included the winter palace at St. Petersburg, Gatchino, Tsarsko-Selo, Peterhof and Levadia. It was at Peterhof that Mr. Harris met the present Czar, who as then a slip of a boy.

In his visits to the palace Mr. Harris often came in contact with Alexander, whom he describes as a man of powerful physique and strong personal magnetism; one who gave at once the impression that he was the ruler and what he said was law.

Alexander was especially fond of the theater and opera, and so he had the palace at St. Petersburg connected by telephone with all the leading theaters. Even at that early day there was an arrangement by which the dialogue of a play, the music and words of an opera could be transmitted from the theater to the home by means of the telephone. In the palace of the Czar a series of transmitters were arranged about a circular seat of cushioned velvet, and here the Czar and several of his friends could enjoy a play without leaving the library.

As soon as the fashion was set by the Czar the telephone sprang quickly into popularity in all the principal cities of Russia. They not only were used in the government buildings, but the business houses of Moscow, Warsaw, St. Petersburg, Riga and Odessa.

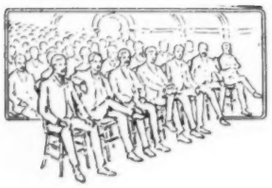
Count Tolstoi was among the others who fancied the theater arrangement so much that he had one installed in his house. Many a time Mr. Harris has sat beside him as he swayed back and forth on his chair in time with the strains of the music that came over the telephone from the opera.

The system installed in the Count's home was a trifle different from that in the royal palaces. The circular arrangement of the transmitters was not followed, but the guests of the Count, when enjoying the theater or the opera from his home, were seated on a long velvet settee, the transmitter being attached to the wall.

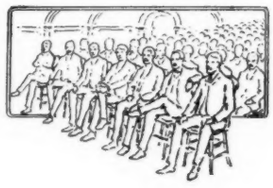
Mr. Harris' stay in Russia naturally made him interested in the outcome of the great war between Russia and Japan that raged so long, and even more interested in the revolution which has shaken the country to its very center. As far back as the early eighties Mr. Harris says an outsider could foresee just such uprisings as have occurred in the country, because the people were beginning to study and think for themselves, and it was but natural that they should revolt against the tyranny which oppressed them.

What the outcome will be, or at least when the trouble will be settled, Mr. Harris, like the rest of the world, says he can only conjecture. He has a novel scheme, however, which, if adopted, he guarantees will put Russia on her feet in five years and make of her a formidable power among the commercial nations of the world. The plan is this.

Let the people of Russia hire a syndicate of Americans—the syndicate composed of men who are at the top notch in the branches of government which they would pilot in Russia—such as commerce, manufactures, labor, finance—men like the advisers of the President of our own republic. Then, if the Czar could be prevailed upon to take a back seat, at a big salary, for a period of five years or a decade, Mr. Harris predicts that the Russian empire would be an empire no longer, but a republic so powerful that it would command the respect of all the world. Russia is destined to be great, and whether it is made a republic during the life of the present ruler is a question. But sooner or later Russia will be a republic.



INDIANA CONVENTION



The Annual Meeting of the Indiana Independent Telephone Association Held at Indianapolis May 17, 18, 1906

By R. D. Fisher

THE first annual meeting of the Indiana Independent diana Mutual Telephone Association—was held in Telephone Association—the successor of the old In- the Assembly Hall of the Claypool Hotel, Indianapolis, May 17-18. The attendance was good and the interest manifested throughout the five sessions was such as to qualify the boast of the Indiana Independents in having the strongest state association in this country. The Indiana association is made up of delegates from the eleven district associations and meets annually, while the district associations hold meetings every three months. This plan of organization has proven very convenient and satisfactory as the results of the first year have proven. The only decoration in the assembly room consisted of an immense banner bearing the following inscription: "In Indiana there are 400 Independent telephone companies, 15,000 stockholders, 200,000 subscribers, $20,000,000 capital invested."

The convention was called to order by Vice-President Theodore Thorward, of South Bend, President George W. Beers not having arrived. Mr. Thorward said the meeting was one of great importance and the work of the convention such as to render time precious. He said the absence of President Beers was to be regretted, but he deemed it advisable to proceed at once with the business of the convention. Under the head of reports of officers, Charles S. Norton, secretary-treasurer, read the minutes of the initial meeting held at Winona last July, concluding with the treasurer's report. Mr. Norton's report was a full and interesting history of the plan of the organization, the division of the state into district comprising seven or more counties, each district branch presided over by a vice-president. The report gave a synopsis of the quarterly meetings held by the district associations and the things accomplished during the first year.

The executive committee made a report through its chairman, Jesse Weik, of Greencastle. This report was full of interest and related in particular to the work accomplished during the first year of the association.

In the absence of President Beers, his annual address was read by Mr. A. C. Lindemuth of Richmond.

Mr. Beers congratulated the association upon the wonderful progress, growth and success during the past year, and said: "That Independent companies are growing stronger every day and in direct competition are proving their superiority to the Bell. Rural telephones and small town exchanges were not known until they were established by the Independents and now they serve nearly every hamlet and a majority of the farm houses in the state. Their long-distance requirements are practically satisfied by connection with their county seats, but the lack of information on the part of the local owners that the development of the Independent long-distance service will furnish in the very near future, to every Independent exchange, connecting with whatsover part of the country its subscribers may require, renders dangerous to your interest the determined effort the Bell company is now making to connect its toll lines with the smaller Independent exchanges operating in communities which had been denied all telephone service retain the support of the people the companies must remain Independent—in fact as well as in name. The best means of holding such companies in line is one of the subjects that should command your attention. Your business requires mutual understandings more than any other that I know of, because the success of each individual exchange depends in large measure upon all the others. The best road to substantial and sustained profit is through organization such as you have in the National-Interstate Telephone Association, of which this body is an important and influential member, represented by delegates of your choosing, will with delegates from other state associations convene next month for the consideration of business which concern the telephone companies of all the states, insuring united action upon all matters of general interest."

Delegates and Visitors to the Indiana Independent Telephone Association's Convention at Indianapolis.

Mr. Beers urged the necessity of all companies becoming members of the district associations and thus becoming workers for the common good, each bearing its fair share of the burden and so aid in the effort to bring all the Independent companies into such close relation that they may understand each other thoroughly as to the territory each is to develop to its fullest capacity, to unite their exchanges into one compact system, operating them under standard rules to furnish service of standard excellence, including a uniform system of accounts and to adopt a standard sign that the Independent long-distance service may be recognized everywhere.

The district vice-presidents and the members of the executive committee have contributed largely to the success that has come to the association during the first year. Mr. Beers said the association was certainly fortunate in having such a capable secretary, who has given his time freely and

to whose efforts and talent we owe in a larger measure than to any other person the success of our organization, and that although the association is in excellent condition to-day, its membership comprising a majority of the Independent companies of the state, let us not feel too secure in resting upon the record of the past achievements, but rather let us face the future with the full knowledge that our present proud position can be maintained only at the cost of earnest and honest effort.

Mr. Beers urged the necessity of selecting efficient and earnest officials for the next year and asked for earnest declarations, thoughtful and wise deliberations during the convention and that harmony may prevail to the end that the conclusions may be wise and just.

There was especial interest manifested in the reports of the vice-presidents from the district associations, as they were calculated to show the condition, progress and development of Independent telephony in the eleven districts of the state.

Theodore Thorward, of South Bend, vice-president of the First District, reported the Independent telephone cause in excellent condition in the seven counties of his district. There are seven Bell exchanges and 3,193 telephones in operation in this district as compared to fifty exchanges and 17,295 telephones in operation by the Independents. Under such conditions it is to be expected that the Bell company is willing and anxious to connect its tool lines with our prosperous exchanges. We do not need them, but they need us, said he. Mr. Thorward said the Independents would soon be connected with Chicago and that would practically give them the entire field in the First District.

Wm. L. Moellering, of Ft. Wayne, vice-president of the Second District, said the progress made by the Independents in the Second District is keeping pace with other parts of the state. Mr. Moellering said the Independent telephones in use predominate so largely in his district that the Bell competition was scarcely perceptible. In many localities the field has been kept clear of Bell competition—especially is this true in the whole of Whitley county. As in other portions of the state the Bell maneuvers in every plausible manner possible to induce companies to tie up with them, but when we point out to the companies the serious consequences of such an act, to say nothing of the folly of such a move on the part of Independents, they remain loyal. It is only because the Bell recognizes that it is gradually being driven from the field that it comes with honeyed words to induce an interchange of traffic with Independents. Only a few years ago they would have spurned all such efforts. The memories of the Independents should be kept thoroughly alive to the fact that the Bell does not expect in any move that they make toward tying up with an Independent company that any real benefit shall accrue to the Independents, but rather for the purpose of gradually crippling the other company. Mr. Moellering said the district meetings were largely attended and that the interest and harmony among the thirty companies of the association could not be better.

W. S. Uhl, of Logansport, vice-president of the Third District, reported that in eight counties comprising his district, there were twelve companies members of the association, and that the membership represents 8,615 telephones of the 12,982 telephones in the district and 866 circuit miles of toll line of the 1,595 circuit miles of the toll lines in the district. There are 12,992 Independent telephones in service as against 4,103 operated by the Bell company. Mr. Uhl said great progress was being made and that 2,000 telephones had been installed during the past seven months. The two district meetings held were well attended and much interest shown.

J. A. Brown of the Fourth District made a brief but satisfactory report. Likewise, O. P. Friberg of the Fifth District, Earl Talbott of the Sixth District, W. W. Mendenhall of the Seventh and A. C. Lindemuth of the Eighth District. Mr. Lindemuth said he represented a Quaker community, but he desired to say that when it comes to fighting the Bell monopoly the Quakers forget all about being noncombatants. In all of these districts good meetings were held and considerable growth and development reported.

W. D. Curll, of Petersburg, vice-president of the Ninth District, reported a complete organization, with seven of the eight companies in the territory as members. Mr. Curll said nearly all the companies in his district have increased their capital stock and increased facilities and extensions were constantly being made. He said a number of the companies had merged with the Central Home Telephone Company of Louisville, and this would result in a vast amount of improvements and extensions. Mr. Curll described the Evansville situation and said while the Independents had suffered temporary defeat they would soon have a franchise in that city. He said the people of Evansville were favorable to the Independent company now seeking a franchise; that the company already has more contracts for business telephones than the Cumberland (Bell) after thirty years of service. No canvas has been made by the Citizens' company for residence contracts. The Pike County Telephone Company lost its exchange by fire, but the fidelity of its patrons was shown by their disposition to wait until it could be rebuilt rather than accept free service which was offered by the Bell company. Mr. Curll said he was sorry to report that the Wabash Home Telephone Company, of Monroe City, had recently placed the Central Union business on its board and asked the association to take action thereon.

"All the Independent companies report increased business —more than they are able to handle," said Mr. Curll. The companies have adopted the standard sign, and conditions are good. We shall soon be shouting " 'hello' into Evansville," said he.

Chas. D. Knoefel, of New Albany, vice-president of the Tenth District, made a characteristic report from the Knobbs: He said conditions were excellent, Independents were loyal and growing in facilities and popularity with the people. The meetings held were well attended and the interest manifested could scarcely be greater.

The evening session was in the nature of a smoker. After refreshments, Jesse Weik, of Greencastle, acting as toastmaster, started the flow of eloquence by telling a few good stories peculiar to the localities from which each speaker came. Dr. R. F. Blont was introduced as the godfather of Independent telephone associations, and related in an interesting manner his attendance at the birth of the Independent associations.

A. C. Lindemuth of Richmond gave an interesting account of the ten months' progress and related some amusing incidents relative to the attempt of the Bell people to persuade the Quakers to forsake the Independents.

M. L. Clawson of Indianapolis made a clever talk on rates and declared that there was equity and merit in the demand for an increase of the rate in Indianapolis. Mr. Clawson said the eminent attorneys who claimed to be in the employ of the labor union in opposing the increase were employed by the Central Union instead of the labor union.

Theodore Thorward of South Bend, L. A. Frazee of Connersville, A. L. Peyton, Huntingburg, A. L. Funkhouser, Evansville, and others gave short talks.

President Beers presided over the morning session of the second day, at which routine business was first dispatched rapidly. The committee on constitution recommended a change in Article 7, relative to membership fee and annual dues, and also that Article 8 be amended so as to provide for the selection of a larger number of delegates from each company to attend the annual meetings.

The interest manifested in the address of Col. J. D.

Powers of Louisville on "Independent Telephone Securities," brought out a good attendance. The address was read by Mr. A. L. Têtu of Indianapolis, and is as follows:

It is with unfeigned regret that I must say to you that matters beyond my control compel me to forego the pleasure of meeting with your association. I have endeavored to postpone important matters that prevent my attendance, but just today find it absolutely impossible to keep my engagement with you.

Independent telephone securities is a question of great moment with the Independent telephone people, and is growing to be a very important question with the general investing public. Nearly four years ago I had occasion to say something on this subject at the convention at Chicago, and after an experience of several years I find little to change the views then expressed. Since then more than one million of Independent telephones have been added to the telephonic total in this country, and the ratio of progress and development has never been so great as at the present time. Millions of dollars have been invested in these securities, and notwithstanding the fierce, unfair, and terrific opposition of the "old enemy" of progress and development, the Independents have maintained themselves and their securities in a way that has been truly marvelous. We have been misrepresented in every conceivable way by the Bell monopoly. The people have been deluded, deceived, and imposed upon in manner and ways that are truly frightful to contemplate. Then the companies have been handicapped by the rapidity of the growth of their exchanges—in many instances they have been forced to a greater capitalization than was originally contemplated two or three times over. These are conditions that have made it extremely difficult to find a ready market for the securities, and to maintain them at a reasonable price.

Independent telephone companies have been forced into being by the intolerant methods, bad manners, and exacting tribute of the Bell companies; and, strange as it may appear, the Independent movement has done more to improve and increase the plants of the Bell telephone within the last decade than the Bell people did for themselves in eighteen years of absolute monopoly.

Think of it! The Bell monopoly, after having the entire field of the United States to itself without competition for eighteen years, installed less than double the number of Independent telephones now in the state of Indiana alone, and we have been in the business upon an average little more than one-third of the time in which they had the field entirely to themselves.

With millions of dollars back of the monopoly, with unlimited gall, unexcelled greed, and the most vicious practices known, outside of Standard Oil, yet the development of the Independent telephones has been so marvelous that it is difficult even for one who has studied the problem to believe the actual figures showing the present status of the movement.

Recently President Roosevelt said in effect in a message to Congress, respecting Standard Oil methods: "The Standard Oil Company profits immensely by open rates, arranged to give it overwhelming advantage over its Independent competitors, which enables it to charge consumers higher prices for oil. The Standard Oil Company has, by unfair, unlawful methods, crushed out home competition." Change this statement by striking out Standard Oil and inserting Bell telephone, and you have a fair statement of the facts of a monopoly more rapacious, less courageous, but equally grasping, with anything ever accomplished by Standard Oil. The hue and cry of the "Bell" over the great and crying evil of two telephone companies in one community is truly pathetic, or would be if it were not so thoroughly ridiculous.

How they seek to protect the "poor, defenseless business man" by crying out against the evil of two telephones! With what sycophantic lamentations it cries out against the injustice to the business man in being forced to take two telephones in order to transact business with his customers!

What forces the business man to take two telephones? The same thing that forces him to advertise his goods in two newspapers in a town instead of one, in order that he may reach the people. What reason is there for a business man to take his second telephone if one will subserve his purpose? The history of the telephone movement since the Bell patents expired shows that in every town in the United States, without a single exception, where two telephones have been maintained for one year or more that the increase in the number of telephones in use has rarely if ever been under 100 per cent. and in many instances 300 to 500 per cent.

Now, what does this mean to the "poor, unfortunate business man," who is compelled by the exigencies of the case to get in direct personal contact with these increased telephone users? For illustration: Take the city of Louisville before the advent of the Independent telephone here; it was impossible for the "poor business man" that was paying much more then for the Bell telephone than he needs to pay now for the same telephone, with very much better service, to communicate over the telephone with more than 3,500 people, including himself. Now, with a Home telephone and a Bell telephone, leaving out 3,000 subscribers, common to both, he can communicate with 14,000 telephones at a cost of very little more than what he paid originally for talking to less than 3,500 telephones.

Now if it was worth to the subscriber $8 a month to have the privilege to communicate with 3,500 telephone subscribers, how much more is it worth to have the privilege of communicating with 14,000?

Take the case of one newspaper in a city with a circulation of 30,000 copies daily; another is started with a circulation of 50,000. The poor business man had been in the habit of advertising in the first paper at an expense of $100 a month, but by reason of the competition and the increased number of readers of the two papers he feels that he is compelled to advertise in the more progressive paper, but by reason of the competition, for $150 a year he can get the same advertisement in both papers.

Now would any sane business man say that it was a great hardship on a business man to be forced to advertise in both papers, and therefore that the new comer, a more progressive paper, had worked a hardship on the citizens of the place? Such drivel and rot has been the stock in trade of the Bell company for years past and perhaps is worse to-day than at any other period.

If men are forced to advertise they do it because their competitors force them. If men are forced to take two telephones, in order to reach the buying public, it is because they want to come closer to the people and keep themselves and their business before the people that they do it.

We all appreciate how careful, how exceedingly prudent, how economic of the city's best interests the "fathers" of the city have become when an Independent telephone franchise is asked for in order that they may come in successful competition with the established Bell telephone.

They tell you how the rights of the people have been frittered away by giving franchises without money and without price to the Bell monopoly, which has enjoyed these privileges for years without paying a cent for it, and that henceforth no other like corporation shall be granted privileges without paying the full price therefor, with all sorts of restrictions made out in detail, so that when the franchise is finally granted, if granted at all, it is loaded down to such an extent that the competition with the old company that enjoys the right to charge what it pleases for its service, pays no tribute to the city. Its rights are not circumscribed, and yet this new company, with all of the handicaps placed upon it by a short sighted policy, must compete with its adversary, who is footloose and free as to many of the clogs that are thrown about the new company. Of course, this is not fair competition. Of course, it is not fair dealing. Of course, it is the old game of the youth without shield or buckler, and armed with a simple sling, going forth to do battle for his people, against the mighty giant, armed capapie. But as even David of old, slew Goliath, so certainly will the Independents protect and maintain themselves and the interest of their people against this giant monopoly, that has nothing in common with the people, except the people's purse, from which they have filched large sums for very small benefits for years. But you may depend upon it, the giant "Bell" Philistian will continue as did its prototype of old, to make boastful proclamations from day to day, breathing forth threatenings and slaughter against the Independent camp of Israel, so long as it can intimidate the weak, frighten the nervous, "film flam" the credulous, or "bam boozle" the public.

At the conclusion of the reading of the paper a vote of thanks for the excellent paper was ordered sent to Col. Powers, also the regrets of the association because of his absence.

The paper arroused quite a discussion and many suggestions were made as to the best method to get it before the people.

A. C. Lindemuth, chairman of the executive committee, presented a resolution directing that the following petition be sent to the Mayor and Board of Public Works of Indianapolis:

The Indiana Independent Telephone Association, in convention assembled, representing 150,000 of the 200,000 Independent telephones in the state of Indiana, operated by 400 different companies with an estimated capital of $20,000,000, respectfully petition you to grant such relief to the Indianapolis Telephone Company, of your city, in its request for a modification of the New Telephone Company's franchise as will enable this company to continue to enlarge and extend its system without financial embarrassment, which we believe will be sure to result under their present franchise rates and conditions. We base our request upon the following facts, well known to all practical telephone men:

The unprecedented development of the Independent telephone business of Indiana, the demands of the public for better and more dependable service, the rapid advance in the price of all telephone material, the necessity for employing skilled labor and technical engineers to operate such intricate and complicated appara-

tus as the modern telephone switchboard and instruments have developed into, and the increased use of the individual telephones have all combined to make the cost of installation, maintenance and operation per unit line in every system increase at a much greater ratio than the increase of units in that system. At the same time the unit earning capacity, that is the earning per telephone, is fixed by city and town ordinances.

Because of these facts there comes a time with all telephone companies, which have accepted a maximum limit in their franchises and which have developed a business two to three and even five times greater than originally anticipated and upon which the franchise rate was based, where the surplus turns to a deficit. That time with all such companies is when the list of subscribers exceeds the number upon which the franchise rate was based and accepted. At the same time, be it remembered that the laws of the state of Indiana absolutley compel all telephone companies to serve all applicants impartially and they must, so long as they exist as an operating company, continue to supply the public with telephone service whether this is being done at a profit or a loss.

Indianapolis, being the metropolis of the state, is also its geological and commercial center. All lines of state commerce and communication radiate therefrom, center therein and pass therethrough. The Independent telephone reaches every community in the state. In no line is the relation of the Capital City more reciprocal and mutually dependent upon the rest of the state than in the telephone business. Not only is this relation mutual, but each is absolutely dependent upon the other for the most efficient and extensive service to the individual telephone subscriber. With the possible exception of the traction lines, no business has contributed more largely to the unprecedented growth of Indianapolis than has the Independent toll lines, with a greater volume of business transmitted over them than passes to and from any other city in the same class in the central states. The 400 Independent exchange companies in the state have made this condition possible.

In their brief eight years of existence, the Independents have extended out of Indianapolis more than twice the number of toll circuits now owned by the opposing Central Union Telephone Company after twenty-five years of existence as an operating telephone company in the state, and are handling today three times the volume of toll line messages at a rate from one-half to one-third less per minute than was charged by the Bell before the advent of the Independents. These toll lines serve not only to bind all of the Independent companies of the state into one great voluntary organization but are also absolutely essential to the welfare and perpetuity of every Independent exchange in Indiana, for without toll line connection with the Capital City, no Independent telephone company in the state can hope to compete successfully with the tactics of the monopoly for the exchange business in its own field. The Indianapolis Telephone Company's exchange system in Indianapolis is the essential terminal for the present toll line company and without such a terminal the Independent toll line wires would be of little use to the Independent exchanges throughout the state.

Our interest, therefore, in the welfare of the Indianapolis Telephone Company is vital. Any condition that will prevent an extension of its service or cause it to meet with a loss in operating, affects in a depreciating way every dollar of investment of the 400 companies of the state.

Knowing that an independent telephone company in Indianapolis is not only an unmeasured benefit to the city itself but also is essential to the life of the Independent telephone business throughout the state, and believing their request of you is just, we trust that you will accept our petition in the spirit in which it is presented and grant relief to the company that is so nobly fighting not only its own battle but also the battle of the people against the telephone trust for efficient telephone service for all the people at reasonable rates.

A telegram of cordial greeting was also ordered sent to the Mayor and Board of Public Works of Evansville for the encouragement given toward the establishment of an Independent system in Evansville, and the secretary was also instructed to send to the Evansville Common Council the following petition of this association:

The Indiana Independent Telephone Association, in convention assembled, representing 150,000 of the 200,000 Independent telephones in the state of Indiana, operated by 400 different companies with an estimated capital of $20,000,000, respectively petition you to grant the Citizens' Telephone company of your city a franchise which, while it safeguards the rights of the city will permit the Independents to have connection with and entrance into Evansville.

Every county of the state is included in this convention, composed of 175 representatives. We deem it almost inexplainable that Evansville, the second city of the state, should be one of the three county seats of Indiana having no Independent exchange. The more surprising does it become when we consider that the Independent subscribers in this state out number the Bell five to one and that there are forty county seats with not even a Bell exchange franchise and several where Bell franchises exist have exchanges numbering less than seventy-five telephones in all of which the Independents have large systems.

We desire to call your attention to the report of the Commercial Club of Indianapolis under date of May 5, which reads as follows:

"We thoroughly believe in the desirability of competition with the Bell Telephone Company in the telephone business in Indianapolis, and we fully realize the benefits which have been derived from competition through this Independent company in the past."

This association, knowing that it is to the interest of Evansville, as it has been to the interest of Indianapolis, to have competition in the telephone business, request that an Independent exchange system be admitted which will insure the gates being opened to Independent toll lines, thereby giving your city telephonic connection with the great body of Independent telephones throughout Indiana, Kentucky, Illinois and the entire Mississippi valley.

The committee on "Uniform Methods of Accounting" made a partial report and asked for the appointment of an advisory committee to formulate such a system.

The committee on rates made a report to the effect that rates were inadequate and out of proportion to the increasing and widening of the service now being given. The committee recommended the gradual education of the people up to the fact that the companies must have more money to operate, improve and extend their lines. The committee recommended that all free business be cut out.

The afternoon session was given up to the election of officers, and resulted as follows: President, A. C. Lindemuth, Richmond; secretary-treasurer, C. S. Norton, Indianapolis. Executive Committee—Jesse Weik, Greencastle; Theodore Thorward, South Bend; Thomas Davidson, Greensburg; C. D. Knoefel, New Albany; Wm. Moellering, Ft. Wayne.

The following delegates were elected to attend the convention of the National-Interstate Telephone Association at Chicago, June 26-28: M. E. Crow, Elkhart; Geo. W. Beers, Ft. Wayne; John L. Osborn, Veedersburg; A. L. Têtu, Indianapolis; C. S. Norton, Indianapolis; A. J. Payton, Rockport; A. A. Ulrey, Decatur; A. C. Lindemuth, Richmond; F. R. Strickler, Franklin; Henry Barnhart, Rochester; L. A. Frazee, Connersville; Jesse W. Weik, Greencastle; E. Hawkins, Noblesville. Alternate delegates selected were George T. Cox, Ft. Wayne, and Frank White, Portland.

The Independent Bulletin was made the official organ of the association, and a vote of thanks tendered President Beers and Secretary Norton for faithful services during the year.

The entire eighth floor of the Claypool Hotel was given up to the electrical manufacturing companies, and a more extensive and interesting exhibit of the latest telephone apparatus and appurtenances of all kinds was never made outside a national convention.

CENTRAL ILLINOIS MEETING.

The Central Illinois Independent Telephone Association held its annual meeting at Peoria on May 9. There were represented at the meeting 6,000 miles of toll lines and 40,000 telephones. In eighty-one counties of Illinois there are now 106,900 telephones, an increase of thirty-eight per cent over last year. In the same counties the Bell has 39,857. In Tazewell county the Independents have thirteen exchanges and 2,972 telephones, the Bell two exchanges and 643 telephones.

It was decided to establish a clearing house through which all toll reports will pass. Peoria will be the clearing center for thirty or forty Independent lines and all companies will settle there.

The new officers for the ensuing year are: President, Sidney Daily, Chillicothe; vice-president, W. G. Olwin, Peoria; secretary and treasurer, H. W. Bullock, Eureka. Executive Committee—J. W. Barrett, Pekin; H. B. Farwell, Bloomington; W. H. Ames, Tremont.

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EDITORIAL DEPARTMENT

THE NATIONAL CONVENTION.

THE 1906 convention of the National-Interstate Telephone Association promises in every way to be the best convention that has thus far been held by the Independent telephone interests. Reports from over thirty states show that the attendance will be large, composed of representative men who are heart and soul in the business to make it a success.

The convention held by the states and districts have all been well attended. The interest manifested in the leading subjects that are being made prominent by this association has been very marked. The recommendations made by the committees on the subject of standard equipment, standard operating rules and regulations, uniformity of action on rates, accounting, advertising, etc., have been acted upon, and in many cases adopted in the different states of the union.

The question of education is one that is going to receive special attention. The press of the country has until within the past year been led to believe that the Independent development did not amount to anything worth mentioning, but now the most conservative magazines and newspapers are eager to get all the information they can on this great industry, and are becoming more and more alive to the fact that there is a place for two great telephone systems in this country, the same as there is for two telegraph systems, and that the city and village representatives, who are looking after their constituents' welfare, will not hesitate to make satisfactory arrangements for the Independents to have a proper terminal therein.

The Independent security market has been subjected to one of the greatest organized systems of warfare ever waged against any public-serving organization in this country. The work at first had the desired effect but the summit of the hill has been reached. Average citizens will credit almost any statement as being true at first, but when they hear the same man or set of men crying down a certain other man or set of men's commodities, they quite naturally investigate for themselves, and when this investigation has been started they invariably make it quite thorough. That investigation was started some months ago by the financial men of this country, and the results have been that some of the most conservative colleges and trustees of trust estates are buying Independent telephone bonds. The big bond houses are buying the securities and recommending them to their clients. This investigation is showing up most satisfactorily, and no one need be afraid of it if they see that their individual properties are properly managed, take care of the growth, and fit in with other systems in their vicinity. Everyone will appreciate, when he comes to study the subject carefully, the importance of still greater and better team work for the organization during the coming year. Let that work be continued at the coming convention. The organization is now well started and its success is but a question of hard work and good organization.

NEW SAN FRANCISCO INDEPENDENT SYSTEM.

MR. JOHN VAN LIEW, treasurer and auditor of the Empire Construction Company of California, and president of the California Independent Telephone Association, in a recent letter to Mr. James B. Hoge, president of the National-Interstate Telephone Association, states that five days after the earthquake and fire at San Francisco a franchise for a telephone system was to be sold, and that his company paid $100,000 for it, and that construction will be commenced as soon as material is available.

This is the true American spirit, and shows the fighting qualities of the Independent telephone men of the stricken city.

San Francisco will rise in regal magnificence from her ashes. Her scourge by earthquake, her baptism of fire, her discouragements, sufferings and losses will, within a short generation, be but a memory, for at the Golden Gate there will be recreated a metropolis of such grandeur that

TABLE OF CONTENTS

National Interstate Convention	S. E. Strong	349-351	Decisions Affecting Telephony	G. W. Hand	398-399
A Model Exchange	E. C. Long	352-354	Manufacturers' Department	W. H. Graffis	400-412
Concerning Central Office Maintenance	S. G. McMeen	355-359	Independent Development	J. B. Hoge	413
The Telephone Line	S. P. Grace	359-362	District Organization	C. C. Deering	413-414
Dictionary of Telephone Words	W. H. Radcliffe	363-369	Standardization of Construction	F. B. Hall	414-415
In the Country God Forgot	J. N. Corbin	370-372	Rural Co-operative Telephone Exchange	H. H. Hutchins	415
Humorous Telephony	J. P. Patrick	373-375	Progress of the Traffic Association	W. S. Vivian	415-416
First Telephones in Europe	J. H. Shoup	375	. ow to Handle Three Company Business	T. F. Robinson	416-417
Indiana Convention	R. D. Fisher	376-379	Tactics of the Opposition	J. H. Shoemaker	417-418
Editorial Comment	H. B. McMeal	380-383	Maintenance of Equipment	R. A. Walker	418-419
Digest of Telephone Patents	E. E. Clement	384-386	Method of Keeping Accounts	H. A. Douglas	419-420
The Telephone in the Philippines	G. W. Rice	386-387	Toll Service	G. N. Bandy	420
A Progressive Telephone Plant	E. M. Rothelle	388-392	Progress of the Month	H. A. Downey	421-431
Some Factors in Voice Transmiss'on	C. H. Coar	393-397	In the Rural Line of Districts	R. McMahon	432

the peoples of the world will wonder and be amazed. Out of ruin is to be born again the peerless city of the great republic, better, stronger, mightier, a lasting monument to the indomitable will of brave descendants of the hardy men of forty-nine, and with the rebuilding of the city an Independent telephone system will be constructed by men who are undaunted, and the new San Francisco will have a telephone system in keeping with its magnificent new city, the pride of the Golden Gate.

A NEW NAME.

IT IS the duty of the delegates attending the coming convention of the National-Interstate Telephone Association to change the organization's name to one more in harmony with its purpose. The merging of the two associations was consummated in order that there would be one great national organization representing the fifteen thousand Independent exchanges now operating, and it was thought best to retain part of the name of each association. The name of the old national association was too cumbersome—"The Independent Telephone Association of the United States of America" was hopeless as a name, while the Interstate Independent Telephone Association could not be used as a national name. In merging, the National-Interstate Telephone Association was selected as a temporary name, which should be changed at this meeting. The new association should be called the National Independent Telephone Association, and in building the organization the Ohio idea of the district and state associations feeding into the national association should be carred out. Every assistance should be given to the new organization, and the slogan of all Independents should be "Look for the Shield."

THE DISAPPEARANCE OF POLES.

NOT so many years ago the problem of providing a sufficent quantity and quality of poles for any telephone and telegraph enterprise was one of the simplest features of the undertaking. But the enormous spread of aerial electrical structures of all kinds in recent times has played havoc with the available supply of satisfactory poles and has produced and is now producing a number of radical and important changes in the situation.

Admittedly, Michigan cedar or its counterpart is the best material for a pole line, because of the fortunate shape of the pole and its satisfactory lasting quality. So generally has this been recognized in the middle west that the forests of those regions have been called upon heavily enough to deplete them to a degree which, in some sizes, has more than doubled the price of poles within the last three years, and in the last few months has increased some of them by more than twenty-five per cent. It can not be expected that the condition with reference to this particular wood can improve, and it is inevitable that the market for this material must become wholly empty of more and more of the sizes which are so greatly in demand.

As a natural consequence of this poverty in the pole situation, other woods than Michigan cedar have been called upon to do service. Cypress, if grown in swampy ground, has a life almost equal to Michigan cedar, although it is disappointing in its very limited taper. Like some other woods, cypress poles are generally so nearly straight as to arouse occasional doubt in the minds of the amateur as to which end shall go in the ground. Chestnut is admittedly an acceptable material, although not as attractive as Michigan cedar, and there may be yet other woods not now considered as available, which by virtue of necessity must be adopted.

A manifest conclusion of this condition is that if the mere requirements of a single art are depleting the forests so rapidly as to necessitate a rearrangement of economic considerations, the demands of manufacture, including the insatiable maw of the newspaper wood pulp mills, must be denuding our country at a rate far greater than most of us really take occasion to appreciate. Another obvious lesson is that it is high time to consider the advisability of actually planting groves of saplings intended to become telephone poles. For such a use naturally the quickest-growing acceptable wood must be chosen, and in this regard catalpa makes a promising showing, as its growth is most rapid, and its lasting quality very satisfactory.

Another fruitful series of speculation is suggested by the experiments now being conducted in the Dominion of Canada, where reinforced concrete poles are being manufactured on the ground by the hole and from which process great things are expected. It is not an uncommon sight also to see across the Dominion great stretches of steel towers, where a few years ago heavy poles would have been utilized.

An immediate and pressing need seems to be a careful restudy of the requirements of pole specifications. Poles with six inch tops now cost much more than poles with seven inch tops a little time ago, and it is a question worthy of solution whether a sacrifice may not be made on the top diameter without incurring a difficulty out of proportion to the saving.

UTAH INDEPENDENT COMPANY DEFEATS BELL.

IT WILL be interesting to Independent telephone operating companies to know that the injunction suit brought by the Rocky Mountain (Bell) Telephone Company against the Utah Independent Telephone Company and Elmer B. Jones to restrain the Utah Independent Telephone Company from using the same numbers in its directory, that the Bell company uses and to prevent Elmer B. Jones, managing director, from using the same number for his residence telephone that is used by the manager of the Bell company for his residence, which case has been pending for some time, was on a recent hearing before the court thrown out, the court refusing to allow the Bell company to introduce testimony for the reason that no cause of action was stated in the complaint and that the matters therein complained of were not actionable and were not of such a character as the court could recognize in an injunction proceeding.

So far as we know this is the first suit of the kind that has ever been brought by a Bell company against an Independent company.

CONVERSATION EN ROUTE.

AN occasional iconoclast denies that man is a gregarious animal. No such contention seems likely to be maintained, when we reflect that solitude is conducive to insanity and that the accomplishment of the greatest men of all time has been incited and inspired by contact with humanity in the mass.

By far the great attractiveness of wireless telegraphy is in its ability to provide for an otherwise unfilled need in connecting ships at sea with shores and with others of their kind.

From time to time, since telegraphy was devised, effort has culminated in the suggestion of means of connecting moving trains with other trains and stations. The systems of Phelps and Edison, notably the latter, enable telegraphy to be maintained with convenience and with ease, and but for the unforunate lack of patronage of a directly remunerative character, the Edison system doubtless would be in service on at least the more important trains to-day. For it was a perfectly rational solution of the problem and was practiced on the New York, New Haven & Hartford lines for time enough to prove it in or out.

There is no reason why the later developments of Marconi and his host of imitators could not be applied to communication to and from moving trains, and an instance of such an application is the lately issued patent to Messrs.

Clement, Lattig and Goodrum, which combines the usefulness of telegraphy and telephony by means of the capacities of trains and wires.

Another and interesting note in the same direction is the proposal of the Central District & Printing Telegraph Company of Pittsburg and vicinity to equip trains with telephone apparatus connected to the car wheels and roof in the same manner as were the original mechanisms of Edison. Adjacent to the track at a low level, and but a few feet from the train roof, is to be strung a wire connected to telephone apparatus in a station or in stations. The arrangement of both fixed and moving equipment is such as to place upon the surface of the train roof and the surface of the fixed wire rapidly varying potentials which will act from wire to roof or from roof to wire, just as does the voice current in a telephone condenser. There would seem to be no reason why conversation may not take place with distinctness, although it seems too early to hope that sounds transmitted in this way will possess that desirable volume required to overcome the noises which accompany railway travel.

As in every previous condition of things, the wish is father to the thought, and it is not too much to say that it is certain that an adequate means of communication with moving trains will be forthcoming at least as soon as the railway public and railway management are really in a mood to require it.

ATTEND THE CONVENTION.

INDEPENDENT telephone men from all parts of the United States will journey to Chicago to attend the convention of the National-Interstate Telephone Association, which will be held at the Auditorium Hotel on June 26, 27 and 28, 1906. Never in the history of the movement has there been such interest in association work, and from all sides the indications point to the largest and most enthusiastic meeting ever held. The program, which appears in another part of this issue, is an interesting one, and delegates and visitors will be treated to a feast of telephone eloquence. From the opening address of the mayor of Chicago on June 26 to the closing of the meeting on June 28, there will be something of interest every minute.

From reports received from the field by the association officials the manufacturers and the telephone press, the indications are that the attendance will break all records, and there have been some well-attended telephone conventions during the past ten years.

It is just ten years ago since the first National Independent telephone convention was held in Detroit, at a time when the movement for better and cheaper telephone service was in its infancy. Since that time many changes have occurred and the Independent movement has grown so fast it has been impossible to keep up with its progress. Independents can well feel proud of the past ten years' work, and the coming convention will be a reunion of the old pioneers, and of the later workers in the field as well. It is a satisfactory thing to know that against all sorts of obstacles the Independents have installed over 3,000,000 telephones during the past decade, and that they have passed their old adversary, the Bell, in the number of instruments in service. It is conservative to say that within three years there will be 5,000,000 Independent telephones in service, and the position the Bell companies will then occupy is a question. It is conceded by all fair and impartial observers that the once proud monopoly is losing its hold and cannot withstand an opposition that is of, by and for the people.

The one important and essential thing for the Independents to do is to perfect their organization. Every man interested in the cause should belong to a district or state organization and thereby become a member of the greater national organization which is intended to weld the Independent telephone industry of the United States into one harmonious whole. To this end TELEPHONY urges every telephone worker in the field to attend the coming convention. Business should be laid aside and, unless the distance is too great, every man having to do with Independent telephone work should be on hand on the opening morning, June 26, and help make the coming convention the greatest in the history of the movement.

THE TELEPHONE VOICE.

SCIENTIFIC invention is achieving a new triumph. The telephone, so we are informed, is about to "change the voices of the nation." There are to be no more dialects, no southern, no northern, no western accent, but instead one harmonious American language, spoken in exactly the same intonation throughout the length and breadth of the land. And it is the telephone, the long-distance telephone in particular, that is to accomplish this. In an interview printed recently in the Atlanta Constitution, Mr. Edward J. Hall, president of the Southern Bell Telephone & Telegraph Company, explains the change that is coming over the spirit of our pronounciation. Mr. Hall was quoted as follows: "The southern accent, too, is rapidly disappearing. There are many causes—the southerner travels more, he uses the language of commerce to-day where twenty years ago it was the language of literature; but, above all, looms the fact that the long-distance telephone is used so much more generally and so frequently. The use of the telephone, little as the casual onlooker may think of it, is bringing all normal voices to a sameness of pitch and engrafting a simplicity in enunciation. In fact, the telephone is gradually changing the voices of the nation." This is a novel idea Mr. Hall has advanced, but we do not fully agree with him. Indeed, one of the rather striking features of telephonic talk is the certainty with which every little personal peculiarity of emphasis and pronunciation is reproduced over a thousand miles of wire. The voice of the man talking into a telephone at Chicago is just as personal and identifiable by his partner in New York as if both talkers were in the same room.

That a constant use of the telephone may improve enunciation and produce a sharp, clear-cut conversational tone is not improbable, at least in the case of telephone operators and others continually talking over the wire; but that its use can bring about any such desirable reformation in the man who talks into it perhaps a dozen or twenty times a day for three or four-minute periods is not very probable. Most men have a telephone voice which they use when telephoning, but immediately afterward drop and revert back to their ordinary conversational tone. The constant use of the telephone may make all voices uniform. Let us hope that it will.

HOTEL TELEPHONES.

ONE of the most fruitful sources of revenue for an operating telephone company is from the systems installed in hotels. Not the pay stations in the hotel lobbies, but the system connecting every room in the hotel with the local system. For this service a five or ten-cent toll is exacted which is collected by the hotel from each guest, when he pays his bill. In Chicago it is stated that the Chicago (Bell) Telephone Company receives $50,000 annually from the Congress Hotel Company for service in the Auditorium, Annex and Great Northern Hotels. In a recent interview R. H. Southgate, president of the Congress Hotel Company, said that the three houses had 1,500 telephones. He would not tell what his contract was with the telephone company, but he made this significant statement, which was about all that was necessary to show the telephone company's profits.

"We have 1,500 telephones and we charge ten cents for

all outgoing calls, and we don't make a cent on the contract. We have to pay ten operators, and if you want to know what our contract is you'll have to ask the telephone company, but there's no profit in it for us. We simply have the telephones for the accommodation of our guests."

Now, the three hotels mentioned are generally nearly full, and it is safe to say that the telephones are used on an average twice a day for each room. Allowing for dull days, that would make something like $100,000 a year from room telephones. Cut it in half to satisfy the most conservative and it still would be an enormous revenue.

Add to that the business at the pay station in the lobby. There are five booths at the Annex and they are busy most of the time. There are two at the Auditorium and there are four or five at the Great Northern. Every other call on some days is a long distance, going to New York, sometimes, or to other places, and it is nothing to see a bill for $3 or $4 for a few minutes' conversation. One hundred dollars a day from that source alone does not appear to be a large estimate.

Mr. Southgate said that the telephone company got all the money except for the pay of the employes, which at the most should not be more than $7,000 a year. So it will be seen the Chicago Telephone Company is getting a good thing out of the Congress Hotel Company.

There are 600 telephones in the Palmer house and the telephone company charges the house sixty cents a month for each instrument, which is regarded as a bargain rate. This amounts to $4,320 a year. There are eight telephone booths in the lobby and it costs ten cents to telephone in any of them.

The other Chicago hotels reported the profits to the telephone company were handsome.

From this it will be seen, especially in cities, that the installation of a complete hotel telephone system will pay large returns.

A LOYAL INDEPENDENT.

THE Bell Telephone Company on May 16, 1906, bought out the Ontario Telephone Company, an Independent organization doing business at Oswego, New York. Mr. W. R. Clements was manager of the Independent company. In a letter to TELEPHONY of date May 22, Mr. Clements says:

Gentlemen: Feeling that you might be interested in the particulars regarding the merger of the Ontario Telephone Company with the Bell, announcement of which was made May 16, 1906, I send you herewith this matter for publication, which you may edit and publish in proper form.

The Ontario company was formed in 1897 by several of the best business men of this city, the purpose of which was to give the public a cheap and efficient service; the Bell service at that time was rotten beyond comparison and its treatment of the subscribers was shameful. The Ontario company was organized with a capital stock of $20,000 and a plant which was considered good enough was built. Subscribers obtained numbered about 250. The service was good. The Bell had so few subscribers that the operator in order to occupy her time was obliged to "bring along her knitting."

In 1902 the capital stock was increased to $100,000 and a North common battery switchboard and instruments were installed, a few improvements were made on the wire plant, toll lines were built and extensions made. The service we gave was excellent, having about 1,600 subscribers up to date.

In 1903 the Bell company put up a new building and installed a modern switchboard, built some subway and outside construction, and when completed began to wage war with us in its usual method. It had tried several years to obtain a right to lay extensive subway and was not successful until on May 15, 1906, when the common council granted it the privilege.

The merger was a hard blow to Independent interests in the vicinity, as it came unexpectedly. Announcement was made in the local papers of this city May 16 of a traffic arrangement between the Ontario Telephone Company and the Bell company. The Independent company had been a most sturdy enemy of the monopoly in Oswego county.

The paid in capital stock of the Ontario company was $100,000, for which the Bell paid $130,000, also assuming a bonded indebtedness of $44,000, making the entire cost of the Ontario plant to them $174,000. The Bell's expenditure in this city alone will figure about $100,000 and it contemplates spending between $50,000 and $60,000 for subways and wire plant. It has silenced its opponent, but at what a cost! Who will be obliged to bear the burden?

Under the arrangement it was understood that myself and operating force were to remain. The officers of the company meant well enough, but what man could turn traitor to a cause which in his heart he knows is right? I have cast my lot with the Independent cause and intend to stay with them as long as I have the power to fight.

Inclosed you will find a copy of my resignation, which is to take effect on the day the Bell company is to take the helm.

W. A. CLEMENTS.

Mr. Clements' letter of resignation addressed to the president of the Ontario Telephone Company follows:

Since the announcement of the traffic arrangement between the Ontario company and the Bell company, it has been understood that I was to be retained as manager in Oswego.

I have given the matter very careful thought and have decided that should I accept any position with the Bell company I could not carry on the work with the spirit necessary to be successful, as my sympathy and interests are with the Independent telephone cause. Please accept my resignation, to take effect June 1, 1906.

Thanking you for your many kindnesses, I am, Respectfully yours,

W. A. CLEMENTS.

There are just two things we should like to point out in connection with this sale. One is the loyalty of real Independent telephone men such as Mr. Clements; the other is the mistaken business policy of the Bell company in paying more for an Independent plant than it cost to build, knowing, as it must have known from experience, that in a very short time another Independent system will be installed. The present policy of the Bell can only bring disaster to its stockholders, and annihilation to a once proud monopoly.

AN IMPORTANT MERGER.

ON May 22, the syndicate headed by James S. Brailey, of Toledo, purchased a controlling interest in the properties heretofore controlled by the Federal Telephone Company of Cleveland, Ohio. By a financial arrangement within this syndicate the control of the Cuyahoga Telephone Company will be retained in Cleveland and will be lodged, for a period of about ten years, in the hands of a voting trust, the trustees of which have not yet been appointed.

By this movement one of the biggest telephone deals in years was brought to a conclusion. The Brailey syndicate is made up of big interests in St. Louis and Columbus, working with Otis & Hough, Wright, McLoud & Baker, and other financial interests of Cleveland; Secor & Bell, of Toledo; the Altheimer & Rawlings Investment Company and Bauer Brothers, brokers, of St. Louis. Among the St. Louis interests, however, it is understood that there are included such men as Breckenright, Jones and Adolphus Busch.

The syndicate has controlled up to this time the long distance lines in Indiana, and the Independent local company in Indianapolis; the long distance company centering in St. Louis, as well as the local concern there, the Home Telephone Company in Toledo, and the Independent company in Columbus, besides being back of the Independent enterprises now being started in Detroit and in Michigan. In addition, the same interests are in control of the long distance telephones through northern New York and Pennsylvania.

The deal on May 22 by which they obtained the control of the United States Telephone Company assures one big long distance concern reaching from Albany through to Kansas City. At the same time the various interests, working under a community of interest idea, are practically in control of the various smaller companies operating in Ohio, in addition to the local companies already controlled. The deal entailed the transfer of stocks worth about $2,500,000.

DIGEST OF TELEPHONE PATENTS

By Edward E. Clement

817,761. Telephonic Repeater; M. Gally. Two receiver magnets acting on the same transmitter diaphragm with a cross connection of coils. Patent unassigned.

817,781. Multiple Switchboard; M. G. Kellogg. An old-fashion test circuit for a magneto system. Patent assigned to Kellogg company.

817,867. Supervisory Signal for Telephone Switchboards; F. R. McBerty. A balanced or bridge arrangement for line and supervisory lamps. Patent assigned to Western Electric Company.

817,920. Metering of Telephonic Services; I. Kitsee. A register at the substation and a make and break device plugged in at the central station. Patent unassigned.

817,921. Electric Transmission; I. Kitsee. Conductors in short lengths having their ends twisted together so as to make a series of condensers. Patent unassigned.

817,959. Alarm Fuse; E. B. Craft. A target thrown up when the fuse wire blows. Patent assigned to the Western Electric Company.

818,068. Registering Apparatus for Telephone Exchanges; C. E. Wright. A register like Mr. Yoder's to keep tab on the operators. Patent assigned to David A. Yoder.

818,145. Telegraph System; M. J. Carpenter. A telegraph key on a desk set. Patent unassigned.

818,236. Space Signaling System.

818,363. Art of Signaling Through Space; both to C. D. Ehret. Amplifying the current changes or fluctuations representing the messages sent by radiant energy. Patent unassigned.

818,480. Binding Post; C. Slusser. A plate pressed upward by a spring clips the wire in the hole. Patent unassigned.

818,527. Telephone Trunking System; W. W. Dean. A polarized trunk relay holds up its armature after current is cut off. Patent assigned to Kellogg company.

818,540. Telephone Exchange System; E. Land. Subscriber's line has a switch which selects an idle trunk to an operator who completes the switching by automatic means. Patent unassigned.

818,602. Attachment for Desk Telephones; J. C. Belden and A. Beutler. A desk set with a pad holder clamped on it. Patent assigned to the Belden Manufacturing Company of Chicago.

818,673. Signal Bell for Telephone Systems; C. E. Egan. A ringer having a winding on one leg and a condenser on the other. Patent assigned to the Egan Electric & Telephone Company of Petersburg, Ill.

818,675. Telephone Signal; A. V. R. Fechtenburg. An auxiliary hook with a tooth circuit maker to be used when it is desired to hold the line. Patent unassigned.

818,698. Telephone; S. P. Levenberg. Receiver and transmitter on a desk stand with horns to carry the sound. Patent unassigned.

818,767. Telephonic Device; I. Kitsee. A magnetic plug which falls off when the subscribers hang up. Patent unassigned.

818,793. Lockout Telephone System; L. A. Schmidt. A pair of relays at each station on a line for cutting off the line in or the line beyond when parties in use. Patent unassigned.

818,807. Telephone System; R. H. Manson. Subscriber's talking circuit employing a Wheatstone bridge with the receiver in the bridge wire, ohmic resistance and chock coils in alternate arms but no condensers. Battery current flows past the receiver but voice currents flow through it. Patent assigned to the Dean Electric Company.

818,982. Extension Arm Telephone; T. J. Skelley. A multi-jointed arm carrying a desk standard. Patent unassigned.

819,049. Electric Bell; J. Erickson. A ringer with the armature yoke clamped on the permanent magnet. Patent assigned to Automatic Electric Company of Chicago.

819,050. Indicating Device for Automatic Telephone Switches; J. Erickson. A lamp and special signal device attached to a first selector switch. Patent assigned to Automatic Electric Company.

819,059. Mouth-piece for Telephone Transmitters; H. J. Guttman. A drawn steel mouth-piece. Patent assigned to Automatic Electric Company.

819,060. Terminal Strip; H. J. Guttman. A strip having the terminals put through openings in U-shape and the ends bent out. Patent assigned to Automatic Electric Company.

819,061. Telephone Switch-hook; H. J. Guttman. A punched hook made in a flat blank and its shank folded double. Patent assigned to Automatic Electric Company.

819,073. Means for Charging Storage Batteries. T. G. Martin. Charging the battery over one side of a trunk from an automatic to a manual exchange. Patent assigned to the Automatic Electric Company.

819,082. Electric Relay; M. Setter. A bell crank relay having all punched parts and a spring shell covering the upper portion only. Patent assigned to the Automatic Electric Company.

819,083. Electric Bell; M. Setter. A ringer having telescoping support for the armature yoke. Patent assigned to the Automatic Electric Company.

819,084. Telephone Transmitter; M. Setter. A transmitter of the inverted solid back granular type similar to the Kellogg but with a cup instead of a bridge. Patent assigned to the Automatic Electric Company.

819,085. Strip of Lamp Jacks; M. Setter. A pressed metal strip with slight openings and partitions formed up. Patent assigned to the Automatic Electric Company.

819,095. Communicating Electric System; A. M. Stark. A power circuit distributed to substations with telephone taps and a switch battery at central. Patent assigned to the Sterling Electric System, Ltd., of Toronto, Canada.

819,190. Electric Signalling System; J. F. Webb and C. E. Frederickson. A step by step selector scheme having double connections to certain teeth. Patent unassigned.

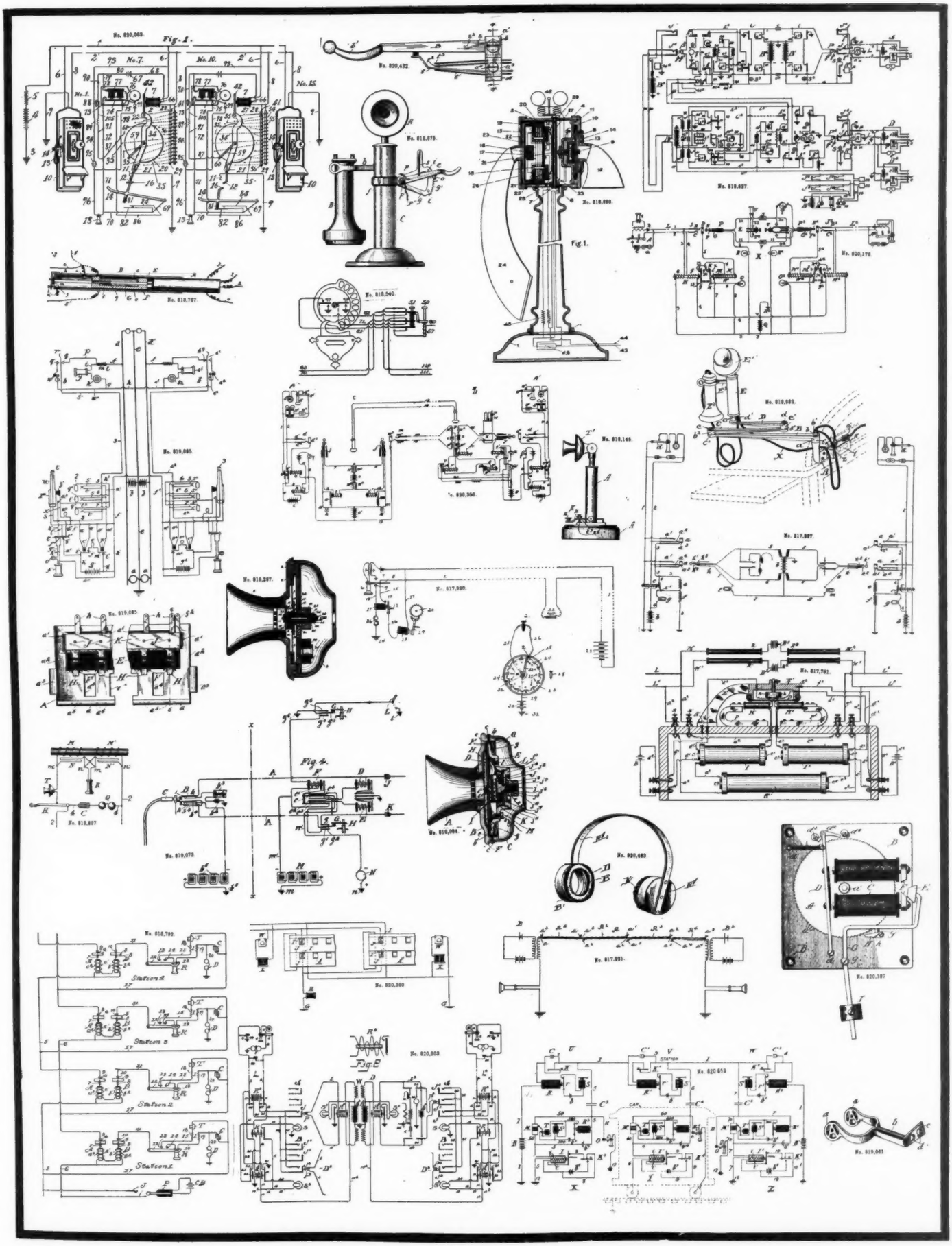
819,231. Alarm System and Apparatus; J. M. Latimer. A portion of the fire alarm circuit used by the Consolidated Fire Alarm company of New York to get quick alarms into headquarters. Patent assigned to that company.

819,267. Telephone Transmitter; W. W. Dean. A transmitter of the inverted solid back type having the cup formed in the diaphragm and two rear electrodes, with a partition between them to increase the resistance. Patent assigned to Kellogg Switchboard and Supply Company.

819,522. Telephone transmitter; E. R. Corwin and F. R. Parker. A solid back instrument with a hard rubber cup. Patent assigned to Parker by Corwin.

819,531. Mouth Piece for Telephones; F. C. Fisher and W. C. Culin. This is an armored mouth piece having a hard rubber plating. Patent unassigned.

820,063. Selective Telephone System; N. S. McKinse



and A. R. Nelson. A party line scheme having synchronous clock works at the different stations. Patent unassigned.

820,064. Selective Telephone; N. S. McKinsey and A. R. Nelson. Another similar system having certain office connections and circuits. Patent unassigned.

820,176. Telephone system; C. L. Boyce. A common battery cord circuit without relays, the lamps being controlled by a pair of line and cut-off relays. Patent assigned to American Telephone and Telegraph Company.

820,187. Automatic Exchange Selector; C. D. Enochs. A selector switch having a step by step pawl and a retaining pawl, both controlled by the same magnet. Patent assigned to the Western Electric Company.

820,213. Sight Indicator for Telephones; F. R. Lay. An indicator to tell which of two telephones has been rung up, the hand being thrown one way or the other by magnets in the two circuits. Patent assigned one-half to W. W. McCale, Greenfield, Ind.

820,350. Signalling System for Telephone Trunk Lines; M. S. Conner. This is a trunking system having the usual shunting relay, having a device for preventing interference with the operation of the signals by earth or other outside currents. Patent assigned to Western Electric Company.

820,360. Multiple Switchboard for Telephone Exchanges; M. G. Kellogg. Application filed February 13, 1892. Line and clearing out signals of opposite polarities. Patent unassigned.

820,432. Telephone Switch; W. E. McCormick. This is the "International" switch with a spiral spring and spring contacts punched with ears and held in slots in a rubber block. Patent assigned to International Telephone Manufacturing Company.

820,463. Attachment for Telephone Receivers; C. Zimmerman. A head spring with one dummy pad and a padded ring to hold the receiver on the other end. Patent unassigned.

820,521. Electrical Protective Device; C. A. Rolfe. A graphite stick for the heating means, and a mercury tube for the controller. Patent assigned to the Rolph Electric Company.

820,652. Telegraphic Systems; Lattig, Goodrum and Clement. Coherers on railway cars together with telephones, whereby any car can be called up and conversation proceed. Patent unassigned.

820,803. Two-division Telephone System; J. H. Lendi. Lines have two relays and two signals each, each line having answering jacks on two divisions and multiple jacks on one. Present invention is common battery, signalling metallic or grounded. Patent assigned to Kellogg Switchboard and Supply Company.

LONG DISTANCE TELEPHONE SERVICE IN THE PHILIPPINES

By George Rice

I HAVE often been asked questions concerning long-distance telephone service in the Philippine Islands. As I was connected with the signal corp while I served with the army in the islands, perhaps I can give some suggestions. I believe that there is a brilliant future for the introduction of the long-distance telephone service, on a greater

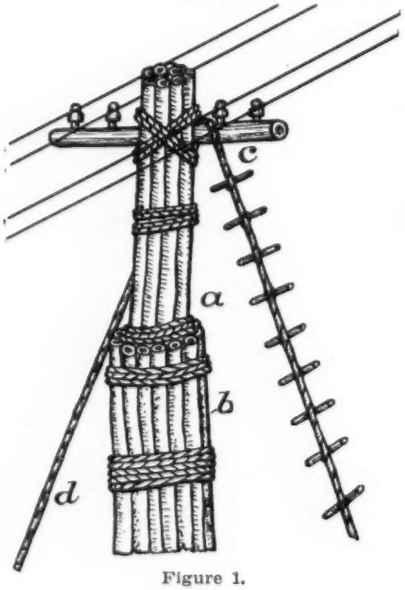


Figure 1.

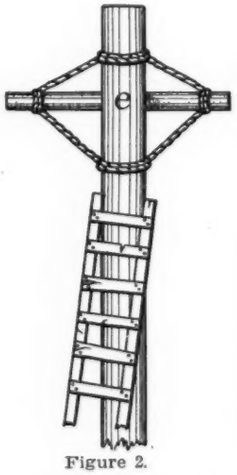


Figure 2.

and more perfected scale, in not only the Philippines, but in all of the countries in that part of the world. Honolulu has kept to the front in modern telephone service, and the same can be said relative to certain sections of Japan and China. In Manila the service has grown very materially since the Americans took charge. The old Spanish systems of communication were costly and defective; the native employes were careless in their work; electrical wire connections were improperly made, and the insulation of wires was neglected. Imperfect installations were frequent, and often accidents resulted. In Manila one sees the first-class apparatus in service from the instruments themselves to the poles and wires, while in the provinces one sees poor apparatus and construction. The work of putting up head guys is not understood thoroughly by the native workmen and there are many poles strained out of line, crossarms out of true for lack of properly set guys. Crossarms seem to twist out of shape

Figure 3.

very freely in the islands, due, no doubt, to use of defective stock and incorrect alignment. Some of the combination poles made by the ingenious natives would surprise you. I made photographs of some of these poles but never obtained the prints, and therefore sketch one in Figure 1. Often the separate pieces of bamboo do not stay together as in the cut. The pieces warp open and a shabby pole results. You will notice that the base poles are more numerous as at *b*. These sink into the ground deep enough to make the pole steady even when the typhoons blow across the islands. Then the main or central combination of bamboo poles begins at *a* and extends upward, often to considerable height. The natives are great pole climbers. Often they go up the pole by use of hands and bare feet. Then again they throw a rope over the crossarm as at *c*, and by holding the lower end *d*, a native mounts the other side by means of the ladder arrangement of stout sticks arranged as steps. I was

amused when I saw a mast of a ship put up as a telephone pole in Figure 2. A vessel had gone to pieces along the beach. The natives stripped the craft of the masts and used these for telephone poles as a telephone company was putting in some lines just then. The manner of placing the crossarm in this case consisted in putting the piece of wood straight through a slot cut out in the pole as at *e*.

We should call attention to the ladder the natives used, as it is typical of their carelessness. This ladder was made of two pieces of two by three stock, with slats nailed across. Nearly all of these slats were split, and in a broken and weakened order. Yet no one would take the trouble to substitute new slats or strengthen the old ones with a few nails. The native linemen are also careless about the chamfering of the tops of the poles. This is often neglected. Then as to painting this part of the pole, and likewise the gains, with one or two coats of waterproof paint, sometimes it is done, and more often not, hence there may be and there may not

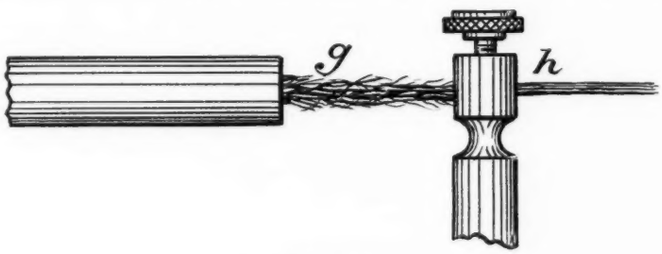


Figure 4.

be the proper preservation of the pole. The butts should be painted also, but this is not always done. I noticed lots of pole bracing. Unless there is an American superintendent right over the workmen, the natives will use but little judgment. I followed along one of their branch lines and really they had put all their best, strongest and heaviest poles everywhere except at the corners where the strains are the heaviest. This happened by chance I was told. Hence there were weak, small, thin poles at several corners undergoing heavy strain, while the bulky giants were in the center line

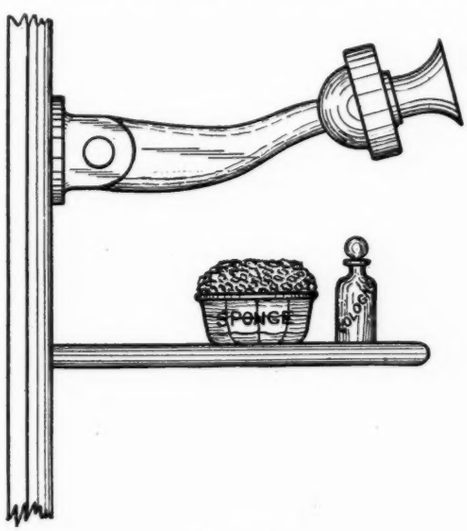


Figure 5.

where there was much less strain. Then the natives are careless in making connections of wires.

Figure 3 shows one of the crude methods employed for wire connections as at *f*. A joint must be solid. It should offer no more resistance than the wire itself and therefore should be made with care. Then in uniting to a post, I noticed that the insulation was often scraped back, taking some of the strands of wire too, thus accumulating the strands at *g*, Figure 4, and leaving only a few pieces for the post at *h*. A funny thing I noticed was in one of the offices where they had a sponge and a cologne bottle as in Figure 5, directly beneath the speaking tube. The average native user of the telephone delights in odors of flowers. He himself may not be scented like roses, but he likes the cologne scents. There-

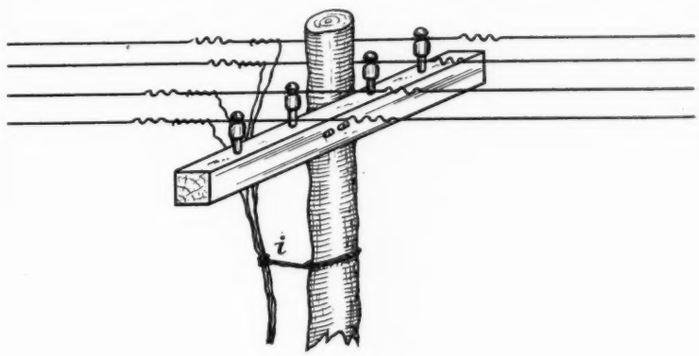


Figure 6.

fore the odd practice of having a sponge saturated with cologne, so that the nostrils may receive the scent during the use of the telephone, is practiced. I saw a queer case of tapping the telephone wires in one of the provinces. Every wire on the crossarm was joined by a cluster of wires as shown. These wires were brought together at *i* and carried down to the instruments as shown in Figure 6. Wire tapping for unlawful purposes prevails in the provinces. The native police are ever on the watch for the tappers, and sometimes catch them, and the rascals are sent to serve a term in Bilibid.

The Filipino linemen are ingenious and willing to work a long time to obtain small results. For example, a typhoon had caused many poles to become inclined over at a sharp angle toward the ground. The husky natives went to work

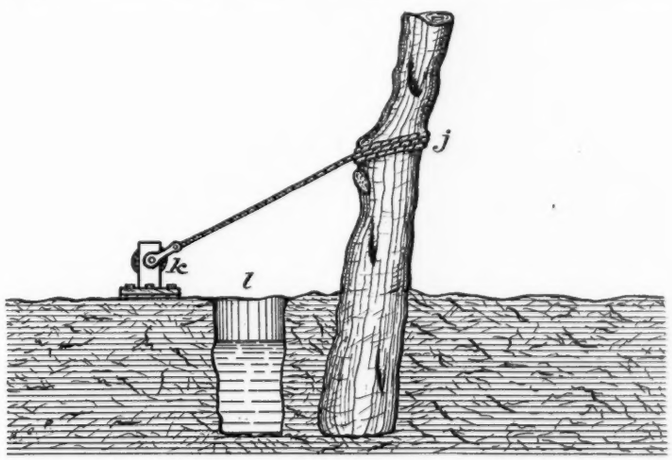


Figure 7.

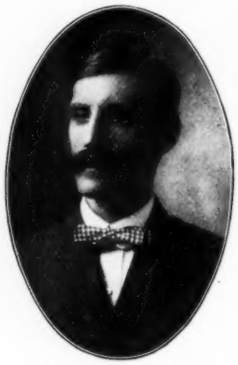
at the problem with a will. First they put in a three-foot diameter hole, about four feet deep, near each pole, digging about two feet away, and further from the side of the incline. The hole presented the appearance shown in Figure 7. This hole immediately filled with water. Then a rope was extended from *j* to a crudely constructed windlass at *k*. The rope was wound up taut and held there, straining the pole. The tension thus obtained was kept up several days. Meanwhile the soggy earth gradually gives way towards the water hole. The tension on the rope gradually pulls the pole up straight. Then the space is filled in back of the pole and in time the pole is straightened.

A PROGRESSIVE INDEPENDENT TELEPHONE PLANT

By E. M. Rothelle

WHILE there are many Independent telephone companies that started in a small way and are now among the strongest organizations in their community, there is probably no other telephone company that has so successfully grown from a small, mutual co-operative association, to a strong Independent system, as has the Macon County Telephone Company of Decatur, Illinois.

The Independent movement was started in Decatur early in 1892, two years prior to the expiration of the fundamental patent on the telephone, when a number of liberty-loving and most loyal-spirited citizens organized a co-operative association under the name of the Citizens' Mutual Telephone Company, of which Mr. C. S. Hankins, whose portrait is shown, was one of the prime movers.



C. S. Hankins.

Just as practically all other Independent companies in the early days of the business entered the field, not as money-making propositions, nor even with any thought of permanency, but with a determination to throw off, as it were, the yoke of grasping and tyrannical monopoly, this company's idea was to connect its subscribers by some sort of telephone system until the then existing telephone monopoly could be forced or would concede to what was considered a reasonable basis, and give its patrons fair treatment.

The company, after having secured the pledges of several hundred subscribers, began building the plant. As was customary in those days, the lines were put in with a grounded return circuit. The equipment was of the old Harrison-International make. The company, soon after it had its system in operation, had more subscribers than the Bell company, when the latter immediately declared a rate war with a view to checking the growth of the new company.

When the Bell company realized that it could not regain its monopoly by a legitimate process of competition through a reduction of rates, it attempted to exterminate its rival by instituting a number of infringement suits and by threatening to collect damages or royalties from subscribers and users for enjoying the benefits of the Independent service, mailing threatening notices to the subscribers as well as to the stockholders.

The officers of the Citizens' company, however, were firm in their determination to succeed or fight to the end,

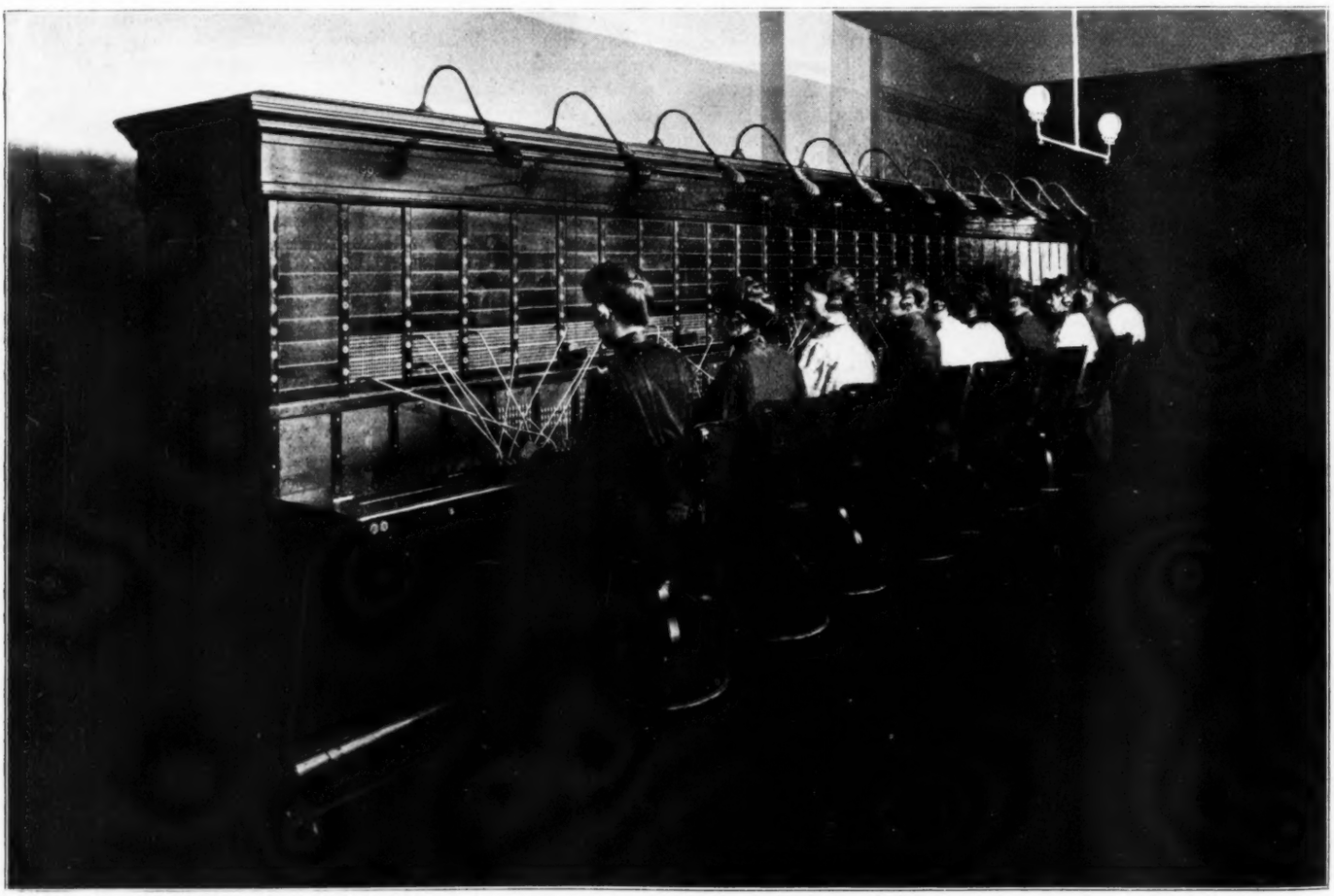


Figure 1. Main Switchboard Macon County Telephone and Telegraph Company, Decatur, Illinois.

and assured their subscribers that they would protect them in every way possible, and that inasmuch as the offense, if any, had already been committeed and a continuance could do no greater harm or damage, they firmly stood their ground, and put up a defense in the patent litigations as best they could. The suits were based on the use of certain parts of the switchboard.

These cases were continued from time to time at the request of the Citizens' attorney, and the matter did not come

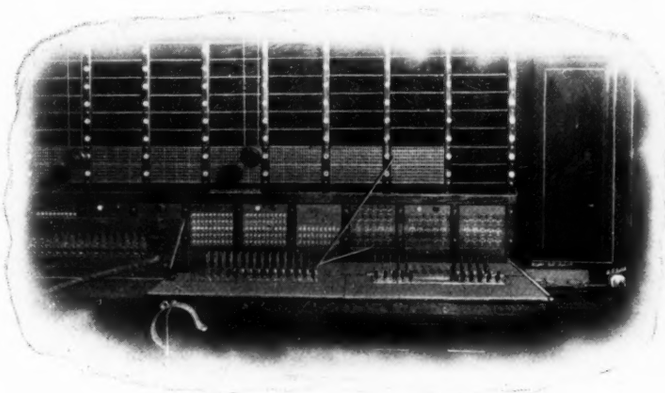


Figure 2. Showing Section of Switchboard.

up for adjudication until late in 1894. Before the case was decided the company had discontinued the use of the Harrison board, and had installed a Utica equipment. When the case finally came up for adjudication, it was decided in favor of the Bell company, as far as the patents involved were concerned, but it could not be shown that the Decatur company was at that time using the infringing apparatus, nor how long they had used it, if ever, so the case was dropped.

After its first defeat, so far as the operating company was concerned, the Bell company did not stop its fight, but immediately started another patent suit on the Utica equipment. This case was again defended by the local company and run for practically two years before it came up for decision. Before the adjudication of this case the Citizens' company again changed its switchboard equipment, and after the patent decision was handed down in favor of the Bell company, it was again found that the Decatur company was not using devices covered by the particular patents involved, nor could it be shown definitely that they had ever used such apparatus.

After the second defeat at the hands of the Citizens' company, as far as putting it out of business was concerned, the Bell company evidently decided that it was impossible to annihilate it by patent litigation, so abandoned these plans and resorted to the practice of stifling competition by buying up its competitor.

About a month prior to the annual stockholders' meeting of the Citizens' company, at the close of 1896, an attorney representing some capitalists, giving his residence as Saginaw, Michigan, came to Decatur, and through some local attorneys bought up or secured options on the majority of the outstanding stock of the Mutual company, before the officers were aware that the object of the new investors was evidently to make a quick turn, or for some purpose other than to operate a mutual telephone company for the benefit of the citizens of the city.

When the annual meeting was called to order it was soon learned that the so-called capitalist from Saginaw controlled a majority of the stock. At this critical moment, Mr. C. S. Hankins, one of the minority stockholders, stepped to the front and made a motion that inasmuch as the by-laws provided that out of the five directors two were to be elected one year for a term of two years and three every alternate year for a term of two years, and this being the year to elect the three new directors, that the meeting proceed at once to elect the new directors, and concluded by saying that he wished to state for the information of the stockholders that the statutes provided that at any election of directors at a stockholders meeting of a corporation the minority stockholders may cumulate their vote so that one-fifth of the stockholders may cast their vote and elect one director on a board of five members—and then handed to the secretary the corporation law and requested the chairman to have the section referred to read before the stockholders proceeded with the election.

Under this provision the local stockholders, by cumulating their vote, could elect one of the three new directors, leaving them a majority on the board. Immediately after this motion was made and before the secretary had finished reading the section of the statute referred to, the stockholder from Saginaw, with his local attorney, disappeared from the meeting, which action, instead of breaking up the meeting, as it was evidently intended to do by leaving no quorum present, was used to good advantage by the minority, as it left them in command of the situation by leaving them to set the date for an adjourned meeting, which was fixed for the following day. It was then very apparent to all of the local stockholders that some definite stand and decisive action must be taken, as most of the options given expired the day of the annual meeting. Through the efforts of Mr. Hankins and others enough of the stock remaining in the hands of the local people to give them absolute control was transferred to a trustee, to be voted by a committee appointed at the meeting, of which Mr. Hankins was one. This left the Saginaw capitalist who, it was now understood rep-

Figure 3. Chief Operator's Desk.

resented the Bell company, in the minority, so at the adjourned meeting the new directors were elected by the local people.

Soon after this the company was again made defendant in a patent suit. The manufacturer of the equipment then used by them neglected to properly defend the case, so the burden rested upon the local company. They again ran the case for about two years. In 1898, shortly before the case

was adjudicated, the Citizens' Mutual Telephone Company discontinued business and its property rights were bought by a local syndicate, who organized the Macon County Telephone Company to continue the Independent service with a clean slate, as far as stockholders were concerned, as well as with regard to patent litigations.

The systems in use during these various changes of central office equipment were all of the individual generator-call local battery type of drop signal trunking boards, with most of the lines of the grounded or common return circuit.

A year ago the exchange again had reached the capacity of its trunking board equipment, and the demand was constantly increasing, so it became necessary to enlarge the system, and also became apparent that it would require a multiple switchboard system to properly take care of the service. At this point a question arose, which is a matter of considerable importance to many of the Independent telephone exchange managers at this time—that is, whether to increase the plant by installing additional trunking sections and by equipping the system with additional transfer apparatus, or to install a magneto multiple equipment to operate in connection with its old telephone and grounded construction, or whether to install or provide for a future full central energy system. To install a complete central energy system by changing the central office apparatus, replacing the telephones and rebuilding the outside construction to metallic lines, would have incurred an expense requiring practically a reorganization of the company.

After a careful consideration of the circumstances and the probable future requirements, and a thorough investigation of the various systems of apparatus on the market by Mr. Hankins and Mr. W. B. Burke, the company's manager for the past seven years, they decided to adopt the new "growing exchange" lamp signal magneto multiple equipment manufactured by the International Telephone Manufacturing Company, of Chicago, and at once started rebuilding the plant with a view to ultimately changing to full central energy, but making the changes at intervals, out of the profits of the business.

This system was designed especially for re-equipping exchanges where companies are required to re-equip their central office to provide for the constantly increasing demands, and where they are not in position to rebuild for complete central energy at one time. The system is so constructed that it may be used in connection with common return or grounded line construction, and with the old style individual generator-call local battery instruments, and at any time changed to a full central energy equipment without discarding any of the central office equipment installed. This enables the operating company to change to central energy at any time, when the lines are built metallic and when in position to replace the telephones.

Figure 1 shows the main switchboard. The board consists of four sections of three operators' positions each. The exchange line equipments are distributed with 120 and 130 respectively in each alternate position, and with 50 self-restoring drop signals for farmer line work in the first annex position. The board is built with a multiple jack capacity for 4,800 lines. The frame is constructed in sections, arranged for three operators' position each. Each section is subdivided with eight panels for the multiple jack space, and with nine panels for the line equipment space, arranged three panels to each position. The framework is self-supporting and is built of architectural iron, so braced and bolted together to make it strong and rigid and properly support the necessary equipment, cabling, etc., and withstand the extra strain to which it will be subjected when making future additions or alterations. The cabinet work is of well-seasoned, quarter-sawed golden oak finish panels. The space in the face of the board unoccupied by the necessary apparatus, is filled in with panels to match the cabinet. The plug-board and the panel back of the plugs, is covered with heavy sole leather. The key-boards are five-ply with the grain of the two outside and central layers running lengthwise, and the grain of the other two layers running cross-wise. The key-shelves are in sections of one position each, and are hinged so they may be raised, leaving the keys open for convenient inspection. The shelves are provided with a Yale lock, to prevent operators opening and using the key-trough for purposes other than that for which it is intended.

The plug-board is drilled for two supervisory clearing-out signals for each pair of cords. In the present equipment for magneto-call service, only one clearing-out signal is installed, but all provision is made so that when the system

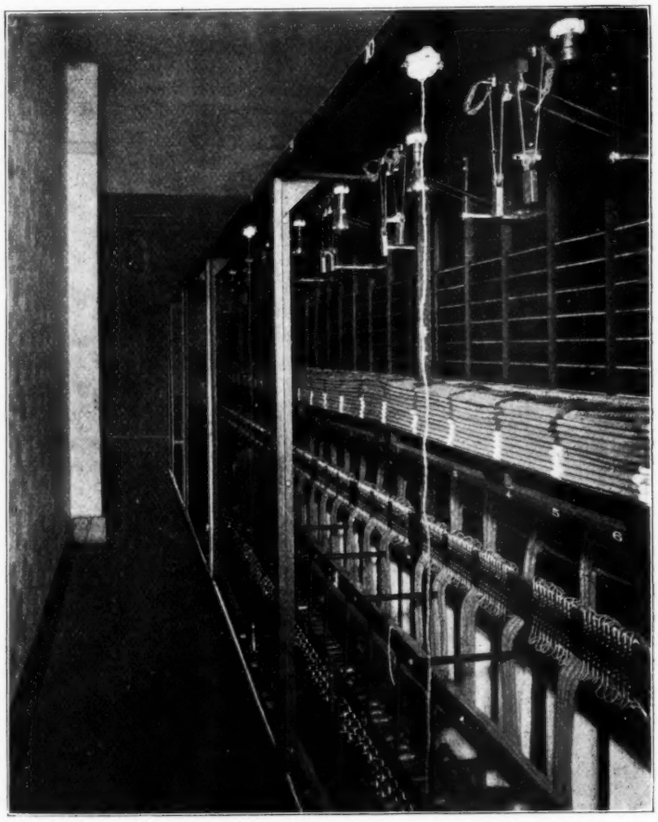


Figure 4. Rear View of Switchboard.

is changed to central energy, the necessary apparatus may be installed for double supervision. On the key-shelves are mounted the vertical type combination listening and two-party selective ringing keys.

Figure 2 shows the face of the first section. The first position contains the necessary multiple jacks for serving as an annex to the second position containing the first exchange lines. The annex position is also equipped with 50 high wound bridging non-inductive tubular self-restoring drop and corresponding answering jacks for magneto-call rural party lines. The springs in the jacks of the drop line equipments, are built of No. 18 B. & S. gauge highest grade spring German silver sheet, and have a bending length of two inches. The springs, near the tip end, normally rest with a strong tension against an insulated stop post, to give a positive plug connection at all times. This construction of the jacks enables using a small plug, such as is necessary for large multiple boards, and avoids all liability of poor and loose contacts when the plug is inserted.

The plugs are of such size as to enable inserting two or

more in adjoining multiple jacks which are built on three-eighths inch centers. The plug is provided with a loose sleeve to prevent kinking the connecting cord when the operator turns the plug, as is customary while making a connection. The sleeve is held in position by a set ring fastened by a small steel screw. This avoids weakening the sleeve as is the case when fastening the sleeve by a screw passing directly through it, and at the same time avoids the liability of operators getting an electrical shock while making connections.

With this system the regular two-conductor connecting plugs and cords are used. The drop restoring device is mounted in the path of the plug and supported on a German silver compensating spring which insures a positive restoring of the drop at all times, even after the parts have become worn from long-continued usage.

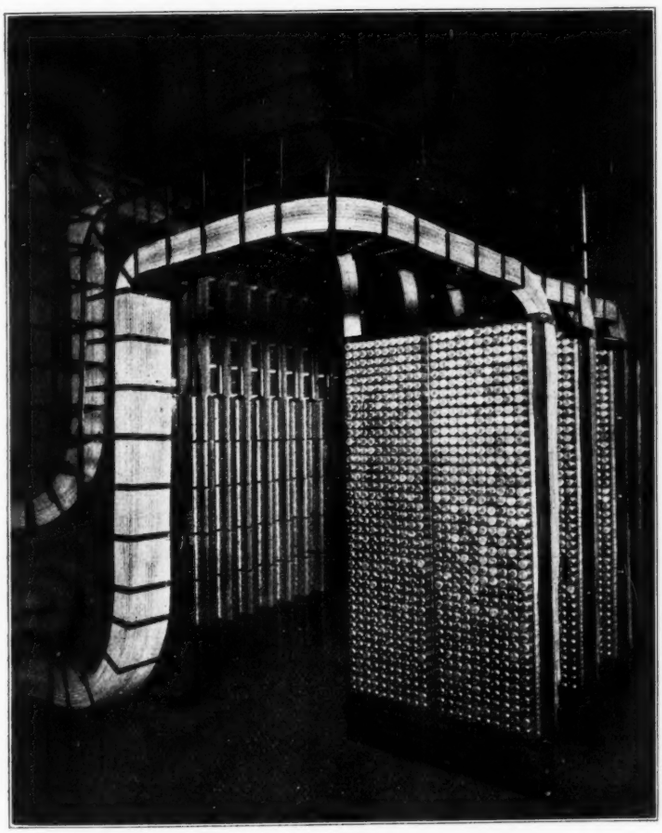


Figure 5. Relay Rack and Distributing Frame.

The exchange line equipments consist of the regular two-spring jack with associate lamp jack and lamp, with line and cut-off relays.

The equipment and wiring is so designed and arranged that the line signals respond to a very slight turn of the subscriber's telephone generator in the old instruments now in use, and so that when the instruments are replaced with central energy telephones, the same equipment throughout can be used by simply changing the connection on the relays already provided, and operate as a regular central energy equipment.

Though the telephones now in use are varied, they having some of almost every style on the market and many of earlier make with weak generators, and having considerable old outside construction with "rust streak" lines, the relays on the new switchboard equipment respond to every call and make the lamp line signal positive and reliable. The relays are of the tubular type, having the coil mounted in a soft annealed iron tube, so that when the armature is drawn up the coil is completely surrounded by iron. The iron of the armature is all supported on the outside of its pivot, so the energy is all exerted direct with no lost force, making an extremely sensitive and positive relay. The coil being completely enclosed on all sides when the armature is drawn up, absolutely prevents all possibility of cross-talk or induction.

The German silver contact springs of the line relays are more than two and one-half inches in length from the contact to the support, giving ample space for a wide and reliable break in the contacts. The springs rest on an insulated stop at the contact end to enable giving them the proper tension, insuring positive contacts. The springs are firmly clamped between mica insulation by heavy binding screws threaded into metal, not depending on threaded rubber or fiber. The relays are firmly clamped to a heavy iron mounting strip, provided with a substantial brass base, with the outer edge threaded, upon which is screwed a brass tube cap completely enclosing the relays individually, making them dust-proof.

Each position of the board is provided with an operator's set, including a line pilot, clearing-out pilot and the necessary order wire circuit to the toll board.

Multiple jacks, in multiple with the answering jacks, are mounted in each six panels of the eight panel sections, enabling each operator to make connection with any subscriber's line without reaching beyond the three-quarter section in which the call is received, making the reach only two-thirds of the adjoining positions.

The multiple jacks are built on three-eighth inch centers. The springs are constructed of No. 18 B. & S. gauge highest grade German silver sheet, and are two inches in length from their support. At the plug end, they rest against an insulated stop and are normally under tension, which insures a positive connection when the plug is inserted. The springs are supported on a heavy metal frame to which they are firmly clamped between mica insulation, by heavy steel machine screws passing through rubber bushings and terminating in metal nuts. The front of the bank of jacks is provided with a metal rail firmly riveted to the frame. The rail is provided with holes of sufficient size to allow admitting a hard rubber bushing outside of the jack ferrule. The front and back of the metal rail is provided with a hard rubber plate. The back plate is milled to receive the test clips and the front plate is drilled to form a shoulder for the ferrules. The ferrules are screwed into the test clips, firmly clamping the front and back rubber plates against the metal rail, and at the same time securely binding the test clips. This construction allows conveniently removing the ferrules from the front of the board, and at the same time gives a strong and rigid bank of jacks.

The line lamp jacks are built in conjunction with the associate answering jack, on a strong brass base to which the springs are firmly clamped between mica insulation, by steel binding screws passing through them, insulated with hard rubber bushings, with the screws threaded into metal nuts. The lamps are supported in a spring collet brass socket, provided with an opalescent disc. The socket with lamp may be easily removed from the front of the board. The lamp jack springs are so constructed that the lamp can be inserted only so the terminals will make proper contact with the jack springs.

Th ecombination lamp and answering jacks are firmly clamped to a strong steel mounting plate by the ferrule of the jack passing through the mounting plate from the front, and threading into the base of the jack. The ferrule is insulated from the mounting plate by a hard rubber bushing. The jacks are set into a hard rubber milled face plate, insulating the frame and preventing the jack from turning out of position.

The clearing-out lamp and also the pilot lamps are so constructed that they may readily be removed from the

front of the board, facilitating the testing or changing of lamps in case of defective signals.

The chief operator's desk is shown in Figure 3. The chief operator's equipment consists of a quarter-sawed oak flat-top desk and top cabinet, all of the same finish as the main switchboard. The desk is of the cordless type to allow all available space on the desk for clerical work. In the top cabinet is mounted a lamp, connected with the line pilot circuit, and one with the clearing-out pilot circuit of each operator's position on the main board. The cabinet also contains a special listening-in key for each operator's set. To signal an operator, the proper key lever is raised. When the key lever is placed in a downward position, the chief operator's set is connected with the main board operator's set. The circuit is so arranged that the main board operators cannot notice when the chief operator listens in.

Figure 4 shows the interior view of the switchboard. The arrangement of the working parts of the apparatus is such that any detailed part may be readily inspected and tested. The frame is provided with a special iron run for the cables. Immediately below the cable run are mounted the clearing-out signal relays with ample space for the supervisory relays when the system is changed to central energy. The cord terminal strips are provided with cord clips and so mounted that the cords may be tested readily or conveniently replaced. The back of the frame is provided with paneled sliding doors, to properly close the board.

For maintaining the lamp signals and operating the relays, operators' transmitters, etc., the system is provided with a storage battery plant and regular power equipment. The battery plant consists of twelve cells of lead-lined wood tank chloride accumulator storage batteries, of sufficient size to meet the maximum requirements of the present equipment for a period of twenty-four hours without recharging, and having a capacity so they may be enlarged by adding the necessary elements only to meet the requirements when the plant is increased to the ultimate capacity of the switchboard, and the system changed to operate full central energy.

The charging machine is of sufficient size to operate the exchange when completed to its ultimate capacity, and is built to operate from a 110-volt direct current lighting circuit. The motor and dynamo of the charging set are connected by a flexible insulated shaft, giving them the appearance of a tandem machine. The dynamo end is of a necessary capacity to generate sufficient current at a suitable potential to meet the maximum demands of the storage batteries when completed to supply the ultimate capacity of the switchboard when operated as a central energy system. The charging machine runs very quietly and without undue heating. The power plant is also provided with a Roth dynamotor, built to operate from a 110-volt direct current lighting circuit, with a secondary output of 100 volts alternating. There was also furnished an auxiliary ringing machine built to operate from a 24-volt storage battery plant, having a secondary output of 100 volts alternating. The ringing machines are mounted on a heavy iron table, provided with a hardwood top, supported on solid soft rubber balls resting on a wooden frame. The table is provided with a marble front to match the power board.

The power board contains the necessary ammeters, voltmeters, voltmeter switch and the required switches and other apparatus for properly controlling the power equipment The power board equipment is mounted on a heavy marble slab, supported on a strongly constructed iron frame.

Figure 5 shows the relay rack and distributing frames, etc. The distributing frame is a combination main and intermediate rack. The line side is provided with 1,300 pair carbon block lightning arresters and Kaisling self-soldering heat coil protectors. The distribution of the lines is done with flame-proof jumper wire. The cable work between the relay rack, distributing boards and the main switchboard, is carried on special overhead iron cable chutes, and is connected in a neat and substantial manner.

This installation not only shows the practicability of a lamp signal multiple board for generator-call systems with grounded line construction, but it also thoroughly demonstrates the "growing exchange" system, constructed originally for generator-call telephones and so arranged that it may be changed at any time to full central energy without discarding any of the apparatus installed.

This gives the Macon County Telephone Company the distinction of not only being one of the first Independent telephone companies in the field still prospering and constantly growing in spite of more opposition than any other company ever had, but it also has the distinction of being among the first to take the lead in re-equipping its exchange with a view to ultimate central energy, when not in position to make the entire change at one time.

FIFTH DISTRICT INDIANA MEETING.

The Fifth District of the Indiana Independent Telephone Association met at Muncie May 5, and in addition to the regular program, delegates were elected as follows:

National-Interstate meeting at Chicago, June 26-28, J. A. Brown, Winchester, with H. O. Miller, of Fairmount, as alternate.

State Convention, Indianapolis, May 17-18: A. L. Johnson, Muncie; Thos. Bromley, Jr., Muncie; O. H. Barnhill, Winchester; J. A. Browne, Winchester; H. O. Miller, Fairmount; F. D. Rusling, Daleville; O. L. Barger, Converse; W. W. Mount, Tipton; Frank White, Portland; K. V. Haymaker, Gas City (P. O. Defiance, O.); W. D. Rush, Union City (U. O. Greenville, O.).

Through the courtesy of Mr. Robert Miller, manager, the delegates were the guests of the Indiana Steel and Wire Company, at its factory.

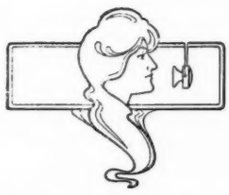
The Fifth District is rapidly coming to the fore-front among the other districts of the state in the development of Independent telephone property. It was conceded by all that the present year bids fair to be the banner year in Indiana for the extension and betterment of Independent telephone property.

Officers were elected for the ensuing year as follows: J. A. Brown, president; H. O. Miller, secretary-treasurer.

TIME BY TELEPHONE.

In the tower of the court house at Hillsboro, N. C., is a clock presented the people of that town by a king of England in the colonial days. Every day as this old bronze clock strikes the noon hour, the Hillsboro exchange of the Morris Telephone Company sends the time to all subscribers on the rural lines, thus enabling them to adjust clocks and watches to standard time. The service of this old clock in this connection is a reminder of the marvelous progress of the world since this timepiece has been doing duty. Doubtless, the king who presented it and the people who received it would have ridiculed any suggestion that the clock's time would ever be transmitted by electricity.

The Morris Telephone Company, which operates the Hillsboro exchange, has its head office in Roxboro, N. C. Its lines reach out into the surrounding cotton country, and a system of toll lines is under way which, it is claimed, will ultimately reach every town in the Piedmont section of the state. The exchange at Hillsboro was only recently opened. The officers of the company are R. J. Teague, president; J. D. Morris, secretary and treasurer.



SOME FACTORS IN VOICE TRANSMISSION

By Charles H. Coar

DURING the transmission of voice or talking currents, several phenomena manifest themselves in such manner that they become factors of no small importance when the conducting medium is so situated or constructed as to be especially productive of these conditions.

Capacity and self-induction are two factors which have to be considered in treating telephonic transmission successfully and at present constitute the greatest problem connected with the long-distance transmission of talking

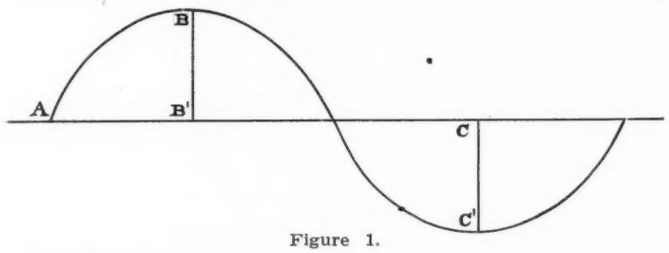


Figure 1.

currents. The effects produced by the presence of these phenomena have been known for some time, and can be computed and accounted for with a mathematical precision where currents of a given output at a given frequency are being treated, such as is usually the case in polyphase power transmission. However, in treating these phenomena likewise in conjunction with talking currents, the problem becomes much more complex, in so much that each individual voice, which may be likened to the power generator as it controls the output, is characteristic of its master and differs in various respects from all other voices. In treating telephonic transmission it has appeared and been proven consistent to produce such circuit conditions as do not seriously conflict with the transmission of that tone which is most characteristic of all voices. This voice tone is also chosen in view of preserving the most important and one which is least affected by the presence of capacity. The master minds of Oliver Heaviside, Campbell and Pupin have done much to simplify the problem, and at this date the prospects for trans-oceanic telephony appear more and more encouraging, because of the strenuous investigation that this subject is receiving at the hands of our ablest engi-

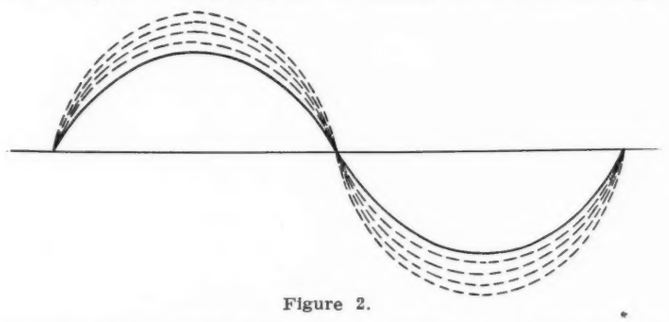


Figure 2.

neers. To Dr. Pupin belongs the honor for having prepared the first practical formula for treating the effects of capacity on transmitted voice currents.

It is the intention, in this article, to bring to mind some of the factors entering into telephonic transmission and to review the methods which have been adopted as a means of bettering the results produced in long-distance transmission. In order to do this properly it perhaps will be well to treat in an elementary manner the nature of sound

Every species of sound can be traced to the vibrations of some body, the most common medium being the atmosphere, and sound produces a disturbance in the atmosphere similar in a way to the disturbance created in a body of water in which a stone has been cast.

Sound therefore consists of a wave motion in the air which radiates out from the point of impact and which is carried forward by the elasticity of this medium in that the minute particles constituting this medium must of necessity be set into a state of vibration by being adjacent to the originally disturbed particles. The disturbed particles, however, remain approximately in the original locality, but transmit the motion imparted them to the adjacent particles and so on with a decreasing range of vibration or amplitude until they come to rest for lack of energy. Stones of different shape, which strike the water with a different impact, produce wave motions of different sizes, having more or less smaller waves upon their surfaces. In a similar manner, sounds of a different degree of loudness or pitch have certain qualities by which they are recognized. A tuning fork will give forth the same sound whether it be soft or loud, and that loudness is dependent upon the amplitude of the vibrations. Pitch is the quality by which we recognize a high or shrill sound from a low or grave one. Pitch

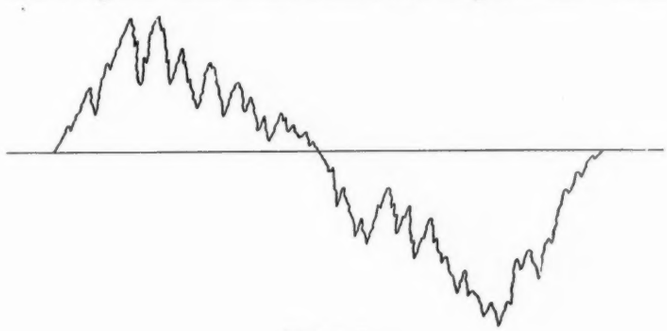


Figure 3.

is dependent upon the number of vibrations. Every sound has, in addition to a fundamental tone wave, more or less overtones or harmonics, by which we are able to detect one sound from another although their pitch may be identical. For instance two different musical instruments may strike a note in the same key, but one differs from the other in its overtones and is identified as being produced by a particular instrument. The amount of overtones or harmonics a sound may be supplied with is termed its "timbre." The preservation of the most important overtones in long-distance speech transmission is a task of no small size and when fully mastered will mean a new era of telephony. In Figure 1 is shown a fundamental curve of a plain sound wave in which the product of the distances B to B' plus C to C' equal the amplitude. Figure 2 shows a sound wave supplied with overtones or harmonics, the fundamental tone being represented by the heavy line.

In transmitting sound over a telephone circuit a transformation of energy takes place, in that the original sound affects a telephone locally, which apparatus transforms this sound into electrical energy, transmitting same to the line over which it produces a corresponding condition of unrest which is taken up by the distant telephone, where it is retransformed into sound. The purpose of the induction coil as applied to telephone work is comparatively well under-

stood and the usual arrangement of applyng this coil in long-distance work is to place the transmitter, the primary winding of the induction coil and the battery in a purely local circuit, which reproduces by induction any changes occurring therein to the secondary winding and receiver which are connected in series to the line. The object of so placing the apparatus is to provide the transmitter and battery a working circuit of low resistance, so that any changes in the resistance and current of this circuit due to the varying resistance of the transmitter while in action will be of greater proportion as compared to the normal resistance of this circuit, than would be the case if the transmitter and battery were connected directly to the line. The current flowing in the primary circuit would be undulating in character while the transmitter was in action, and the current produced in the secondary circuit would be alternating in nature. The currents flowing from the secondary would be dependent upon the ratio of transformation between the primary and secondary windings. The usual practice is to provide the secondary with a larger number of turns so that the currents transmitted to the line are of a higher voltage and lower amperage and therefore better able to overcome resistance. The secondary currents are very similar to high potential, high frequency alternating current of extremely small amperage, the currents in the lines being at times as low as .00001 ampere. The wave shown in Figure 3 will furnish some means of knowing the general nature of sec-

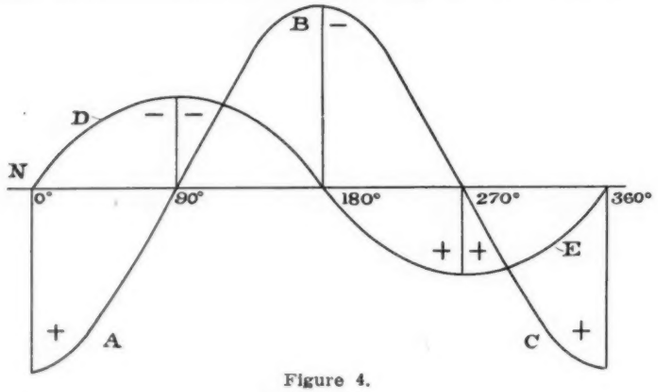


Figure 4.

ondary voice currents which are extremely complex in that the number of current and frequency changes is great. If the plain resistance were all that had to be considered in treating the transmission of voice currents, the task would be comparatively simple to increase the range of transmission, but unfortunately the presence of capacity is so great in all circuits of any great length that it forms the basis of one of the greatest problems before the masters of the art today. Every circuit possesses more or less capacity and is therefore a condenser and can store within itself a certain charge. A circuit possessing capacity becomes elastic, so to speak, in that at the time when the current flowing over it, is greatest, it accumulates a charge, which it gives back to the circuit at the time the producing current weakens. That the current discharge due to capacity is ninety degrees in advance of the producing current or actual line electromotive force, seems strange at first thought, but this fact can be readily proven. In Figure 4 two curves are shown as a complete cycle, the curve *A, B, C,* representing the actual line electromotive force and *D* and *E* represent the discharge due to capacity, *N* being the zero or no potential line. Referring to Figure 4, in this instance, during the first quarter cycle the actual line electromotive force is decreasing from the maximum positive potential to zero, which it reaches at ninety degrees. During this decrease the condenser effect discharges negatively and reaches its maximum at ninety degrees also. The actual electromotive force then changes polarity and increases from zero to its maximum in the negative value, which it reaches at 180 degrees, during which time the condenser effect absorbs a negative charge, the maximum amount also being reached at 180 degrees. From this point the actual electromotive force recedes negatively to zero, which it reaches at 270, during which time the condenser effect discharges positively to its maximum, reached also at 270 degrees, and so on throughout the complete cycle. From this it will be seen that the current due to the condenser discharge is ninety degrees in advance of the electromotive force pro-

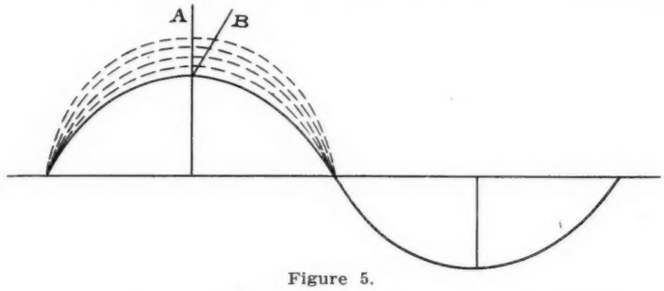


Figure 5.

ducing the same. This is readily understood when one considers that the flow of current due to capacity accumulates during the time the actual electromotive force is reaching its maximum and that this current is discharged, during the time this current decreases towards zero. In so much as the currents due to capacity discharge in an opposite direction to that of the current producing them, these discharges would be in an opposite sign and would therefore be ninety degrees or a quarter cycle in advance of the current producing them as mentioned before. The quantity of electricity flowing depends on the strength of the current and the time that it is allowed to flow. Now considering a circuit possessing capacity over which an alternating current is flowing, the current is absorbed to a more or less degree throughout the length of the circuit and may not reach the distant end of the circuit in its true value, prior to the time the current changes value at the transmitting end if the capacity or length of the circuit is great enough. Therefore sufficient time has to elapse between the reversals in the source of the current, or the line current will not have time in which to change throughout the entire length of circuit, and thus will not reach the distant end in its proper portion. The time it takes a current to reach a definite portion of its maximum value at the distant end of a circuit is called the "time constant" of

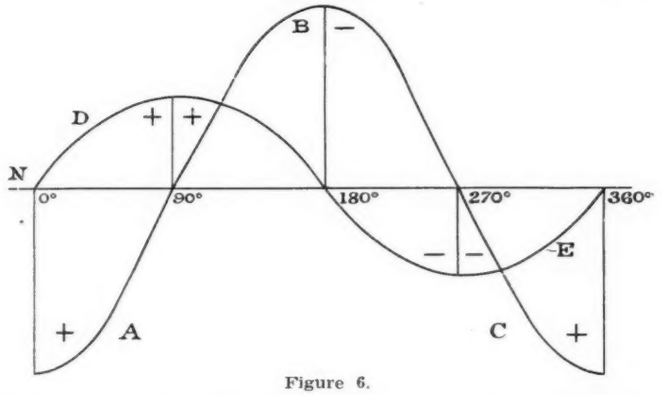


Figure 6.

that circuit. Should the time constant of a circuit be greater than the time required for one reversal in the source of current, the transmission of the circuit will be inefficient to a proportionate degree. From the foregoing it will be evident that the effect of capacity in a circuit is to alter or distort the wave form. This distortion affects the higher notes, overtone or harmonics, much more readily than it does the fundamental tones, thus causing voice currents to lose much of their timbre or clearness.

Further increase in this distortion is due to the fact that the angle of advance for the higher frequencies and overtones is greater than the lower, in that these qualities are absorbed more readily.

Therefore the overtones or harmonics are distorted with regard to each other as well as in their relation to the fundamental wave form.

The sound wave shown in Figure 5 will possibly make this clear in that the overtones have been alloted a certain angle of advance, this angle being designated by the letters *A* and *B*. We might say that capacity caused the wave forms to spread out, both backward and forward, and therefore tends to flatten them out so to speak. This spreading out of decaying effect from the original wave form is called attenuation. The attenuation of a transmitted wave form is shown in Figure 7, where it will be noticed that the overtones are gradually dissipated until there are but few to be received at the receiving end of the circuit. While in Figure 7 the attenuation is represented as occurring by gradual degrees, the effect often becomes very marked when the circuit is increased over a certain length or when the capacity rapidly becomes greater. The phenomena of self induction has an important part allotted it to perform in long distance transmission, and therefore will be treated here. The fact that a magnetic field, or lines of force, are set up at right angles about a conductor through which a current is flowing has been known, and that in a coil composed of many turns each turn must lie to a certain extent within the field of the adjacent turns. Therefore in this condition each turn has an inductive effect upon the turns adjacent to it. While the current through such a coil is decreasing there occurs a relative change in the number of lines of force about each conductor or turn which induces a current in the various turns flowing in the same direction as the producing current.

At such times as the current flowing through the turns is increasing there occurs a relative change also, but the currents induced in the various turns now tends to flow in an opposite direction to that of the producing current. This action is termed self induction.

From the foregoing it will appear that the currents due to self induction tend to aid the line current during the time it is decreasing and to oppose this current while it is increasing. The presence of self induction in a circuit transmitting alternating current tends to delay any changes in the current strengths which are due to the changes in the line electromotive force. That the currents due to self induction lag behind the electromotive force producing them appears consistent and is a fact. The reason for this is that at the time the line current is changing most rapidly currents created by self induction are maximum and that at the time the line current is not changing the currents due to self induction are nil. On a circuit where the electromotive force varies according to the law of sines, the currents due to self induction lag a quarter phase or ninety degrees back of the current producing them. This is shown in Figure 6, where the curve *A, B, C,* represents the line electromotive force at the line *D, E,* the currents due to self induction. As the line current decreases from the maximum positive at *A* to the zero line the currents due to self induction will be of the same sign and tend to aid the line current, and as the line current rises from zero to its maximum negative value the currents due to self induction are opposite in effect, positive, and therefore tend to oppose this rise and change.

It is evident, then, that the currents due to self induction would act in a similar manner during the next half cycle, and that they are ninety degrees behind the currents producing them. By comparing the curves shown in Figures 4 and 6, it will be readily seen that the effects of capacity and self induction are exactly opposite under proper conditions, and therefore the presence of one in a circuit would tend to neutralize the others. The amount of self induction possessed by a given coil will be much greater if the coil is wound on an iron core than would be the case otherwise in that iron conducts the lines most readily. The effects of self induction on the transmission of voice currents is to retard any changes in the fundamental or overtones, thereby decreasing the harmonics as well as to change the phase relation of the overtones in so much as they are of a higher frequency. Coils of wire having many turns wound upon an iron core possess much self induction and

Figure 7.

present much impedance to the passage of rapidly changing currents. This fact has made possible the extensive use of bridging telephone systems, in which the ringer coils can be bridged across the circuit permanently without providing a path for the voice currents to flow over because of their high self induction, and therefore impedance to such currents. The currents used in ringing are of lower frequency, from twenty-five cycles up, and can pass through the ringer coils and actuate the signal. This will not be wondered at when one considers that voice currents have a variation of from 100 to 2,000 periods per second, the lower or bass tones having the lower frequency.

From the foregoing brief discussion of the phenomena of capacity and self induction it will be evident that all circuits designed to transmit voice currents should be free as possible from either of these conditions or from any surroundings which would tend to be productive of them. The wonderful development of telephony has necessitated oftimes that the circuits be confined to the smallest possible space because of the large number of such circuits which enter into a common point, such as the exchange building. This necessity has brought about the use of cables which consist of a large number of conductors placed under one outer covering. To describe the various kinds of cable that has or is in use would consume too much space, but it is safe to say that many of the objectionable features which were possessed by the earlier makes have been eliminated in the modern. However, there is still one factor possessed by cables, namely, capacity, which makes conversation almost impossible over circuits of any great length. The ever-increasing use of telephone cables in modern construction has done much to stimulate active research and experimenting with a view to overcoming the evil effects of capacity on speech transmission. From this it must not be presumed that the effects of capacity in open circuits is to be neglected, for in long lines it is appreciable and must be considered. The capacity of a mile of wire in a dry core telephone cable having a paper insulation is approximately .08 micro farads,

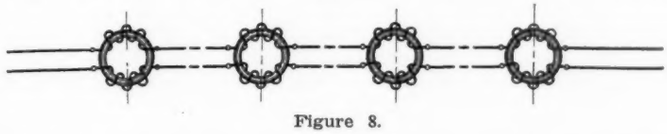


Figure 8.

while the capacity of an ordinary toll circuit for a mile will be approximately .008 micro farads, both depending on local conditions and surroundings. It has been mentioned before that by properly proportioning capacity and self induction the effect of capacity in a circuit can be overcome. Mr. Oliver Heaviside was probably the first person to realize the importance of this fact, and he conducted some extensive experiments which made him absoluetly sure of it. However, he never determined the proper portions which should be placed in a circuit to overcome capacity by self induction

of inductance as it is termed in this connection, so his experiments never had any commercial success.

The earlier experiments to produce a distortionless circuit by means of distributed inductance failed primarily because the scheme then was to place the inductances in multiple with the circuit, in which position they would act as shunts. Inasmuch as capacity acts as a shunt also, it appeared best in subsequent experiments to counteract the effect of capacity by inductances placed in series with the circuit under treatment. With the inductances placed in multiple it would be most impossible to provide each inductance with the proper electrical proportions for the production of a distortionless circuit, in that the shunts would be placed in a more or less distant position from the transmitting or receiving ends, and therefore would have to be adjusted to compensate for the difference in their current supply due to the drop in line voltage between their various positions.

The problem was still more complicated, due to the fact the voice currents have such a wide range of variations and also because each voice is characteristic of its master. The problem, then, was to select the most important period of variation from among the range of from 100 to 2,000 per second and to so figure with regards to its frequency as to preserve it, by the proper introduction of inductances.

The honors are due to Dr. Pupin for having provided the first practical formula and system of distributed inductances

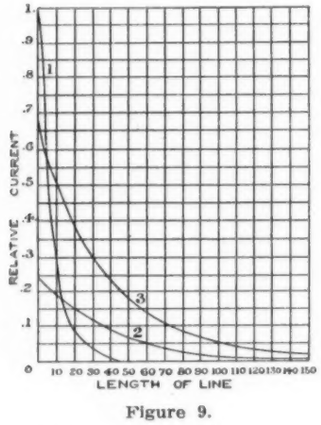


Figure 9.

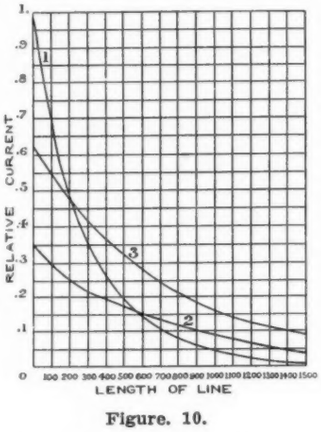


Figure. 10.

and his subsequent labors on this perplexing question reflect much credit on his former experiments, which were so highly successful in that they teemed with the proper application of theory and facts. Dr. Pupin's scheme is to place the inductances or load coils in series with the line, as shown in Figure 7, at stated intervals, and to so proportion these coils that they will tend to preserve the most important overtone which was selected as having a frequency of 750 periods per second. This frequency would, therefore, have a wave length of approximately fifteen miles, a factor of much importance in the problem under consideration.

The following reply of Dr. Pupin to a question asked by Dr. Crehore during a discussion of this subject before the American Institute of Electrical Engineers at Philadelphia in 1901 is highly instructive as it brings out some of the details of the scheme he proposed to use with cable conductors. Dr. Pupin said: "I made a calculation for a particular form of cable, say three-tenths of a micro farad per mile, and in order to give the cable a sufficiently small attenuation constant for 750 periods I introduced inductances so as to give three-tenths of a henry per mile." Referring to the application of these inductances to cables he said: "I wound the core two inches and a half external and one inch internal diameter and six inches long with a very fine iron wire." Dr. Pupin also said: "The whole trick is in having a very fine iron wire, it being necessary to have an iron wire two mills in diameter. This is a very fine Swedish iron wire. They can draw it down very easily to two mills in diameter. You wind two coils in inductive relation to each other, each coil having forty turns of copper wire, and place them about eight coils per mile. That is a distance of from 600 to 700 feet apart. Coils like that can go right into the sheathing of the cable. It is all a question of Foulcault current losses in the iron cores. These can be reduced to a very small amount. I calculate that twenty-five coils like that, with a frequency of 750 periods, would be equivalent to adding one ohm to the line. So that form of cable is a practical form. Instead of having them 700 or 800 feet apart you can make them a little more frequent."

While to a great extent the facts outlined in the above remarks of Dr. Pupin have been adhered to, several points in the method of placing these load coils, as they are now termed, differ from the previous arrangement. In some instances the load coils to be introduced in cables are confined within an outer case of iron, a coil being provided for each circuit and inserted at a given point. In outside construction the coils as equipped and mounted on the poles resemble closely a transformer. The coils are well insulated and protected from the action of the elements by being in many instances completely embedded in a mineral wax. As mentioned in Dr. Pupin's remarks, the coils are wound so as to provide a complete magnetic circuit as shown in Figure 8. One of the most important factors considered in loading a circuit with these coils is the length and frequency of the most important wave length and the amount of attenuation or decay which occurs in transmitting this wave over the circuit to be treated. By means of the formula developed by Dr. Pupin, it is possible to calculate each circuit and allot to it the proper amount of distributed inductances to counteract the effect of capacity by self induction. Dr. Pupin maintains that the load coils should be placed considerably nearer than one-half of the most important wave length, and in this manner a circuit is produced which is as near distortionless as can be provided and which will preserve the most important overtones as well as materially aid in transmitting the lower or fundamental tones as well. Experiments with various kinds of load coils on the circuits of the American Telephone and Telegraph Company has proved that coils provided with iron cores work equally well as those composed of straight inductance without the presence of iron in their make up. This was advocated by Dr. Pupin in his earliest experiments.

It was feared that the losses in the iron cores due to Faulcault currents would be decidedly detrimental, but this has been overcome by use of extremely fine wire, thus providing many laminations in the core which would tend to prevent the production of these currents. The same experiments apparently indicated that the loss of the highest overtones did not materially lessen the intelligibility of transmitted speech. The following data concerning one form of coil as used in aerial circuits will give further light on their construction. The coils have a normal resistance of 2.4 ohms, an effective resistance of 15.5 ohms at a frequency of 2,000 periods per second, and an inductance of 2.5 henry, a time constant of .048 second during a frequency of 1,000 periods per second. A complete coil as provided with a outer iron case as is used in aerial construction will weigh approximately fifty pounds.

The spacing of these coils as before mentioned depends entirely upon the conditions of the circuit to be treated, and in aerial work they are a mile or thereabouts apart. One factor has been brought to light in connection with loaded circuits which has proven to be of much importance, and which was at the first neglected. This factor has been termed "reflection," and its effect is especially noticeable when a loaded and an unloaded circuit are connected together, as would necessarily occur very often in commercial telephony. This is due to the difference in the inductance of the different parts of the completed circuit. The arrange-

ment to overcome this fault as advocated consists of gradually lessening the inductance of the load coils as they near the terminal point or place of connection with the unloaded circuit. These coils having a gradual inductance retain the same spacings that the regular line coils have. In order to furnish the reader with some curves obtained from commercial loaded circuits, Figures 9 and 10 are reproduced from an able paper on this subject, which was presented to the International Electrical Congress at St. Louis during 1904, by Dr. Hammond V. Hayes. The curves shown in Figure 9 were obtained from a standard No. 19 B. & S. telephone cable, the mutual capacity existing between the two wires under experiment being .068 microfarads per mile.

The inductance added to this circuit in the shape of load coils amounted to .06 henry per mile. In Figure 9 the absissae show the different lengths of cable and the ordinates the relative current strength. The curve I in Figure 9 illustrates the attenuation of current in an unloaded circuit as the length of the current is increased. It will be noticed that the attenuation increases at a very rapid rate with any increase in conductor length. Curve 2 represents a similar circuit loaded, but not arranged for reflection losses. This curve brings out the fact that the initial current is about one-half of that obtained in the unloaded condition, and also for the shorter lengths the unloaded circuit is highly preferable. Curve 3 represents the circuit loaded but equipped with graduated inductances near the terminal apparatus and proves that this is the most efficient method for use with long circuits in that the relative current received at the longer distance is greatest.

The initial current received in curve 3 is also smaller than that of curve 1, a further indication that the unloaded circuits are best for small distances. From curve 3 it would appear that the ratio between the current transmitted and received is approximately as 50 is to 1.

The curves shown in Figure 10 were obtained from an aerial circuit of copper weighing 435 pounds per mile. The loading coils on this circuit were so placed as to add about .1 henry of inductance per mile.

The curves 1, 2 and 3 represent the same values as in Figure 9, the curve 1 being obtained from the circuit in an unloaded condition, the curve 2 from the circuit loaded, in which no graduated inductances were used, and curve 3 represents a loaded circuit with graduated inductances.

The curves shown in Figure 9, if compared to those shown in Figure 10, will make the fact very evident that the greatest distortions occurs in circuit confined to cables, and that the greatest benefit results from employing load coils in such circuits. The problem of trans-continental speech has many possibilities and will undoubtedly be successfully accomplished at some early date. Its feasibility from a commercial aspect forms another question, as a submarine cable is a very expensive affair, and is therefore required to transmit many messages at good prices in order to be a paying investment to its owners. It appears at this time that lengthy submarine cables designed for speech transmission would have to be capable of handling simultaneously telegraphic signals as well in order to make it commercially efficient. It would also appear that a loaded submarine cable could handle more telegraphic signals at a greater speed because of the absence of the capacity effect. However, we may rest assurred that this feature will be readily developed after the feat of successfully transmitting voice currents to foreign lands is accomplished. At this date it might be presuming too much to imagine a man in Chicago holding conversation with a man in London, but the successes so far achieved speak well for future developments. This problem affords the coming engineer an inviting field for research, provided he has access to the apparatus required for practical experiments which must necessarily follow any theoretical calculations.

TEXAS TELEPHONE CONVENTION.

The Texas Independent Telephone Association held its annual convention at Waco on April 26. There was a good attendance, the representatives of about thirty of the Independent telephone companies of the state being present. A number of people from outside the state who are interested in Independent telephone matters were also on hand and took an interest in the proceedings. The opening session was presided over by President E. W. Dunaway of Dallas. The address of welcome, on behalf of the people of Waco, was delivered by Homer D. Wade, secretary of the Business Men's Club of the city. He said that the fact that Waco was the headquarters of the largest Independent telephone system in Texas made the holding of the annual convention in that city especially appropriate. The minutes of the last meeting were read by Secretary J. B. Earle of Waco, and adopted.

J. C. Castle, President Texas Independent Telephone Association.

A letter was read from J. B. Hoge, president of the National-Interstate Telephone Association, sending greetings and tendering an invitation to the state association to send representatives to the national convention.

The remainder of the session was devoted to the reading of papers on various subjects relating to telephone matters and to a general discussion of topics of interest to the association.

The following-named officers for the ensuing year were elected:

President, J. C. Casler, Fort Worth; vice-presidents, C. W. Roberts of Abilene, C. A. Wilson of Granger and Thomas O'Rourke of Shreveport; secretary and treasurer, C. A. Shock, Sherman; delegate to the national convention, J. B. Earle of Waco; alternates, A. M. Donaway, A. E. Shaeffer, Thomas O'Rourke, C. A. Wilson, J. A. Murray and W. P. Johnson.

DECISIONS AFFECTING TELEPHONY

By Gilbert W. Hand

COMPANY BOUND BY ORIGINAL CONTRACT WITH CITY.

THE important litigation between the city of Chicago and the Chicago Telephone Company has been fully reported by the Supreme Court of Illinois, and on account of its wide application throughout the country as a precedent and its great importance to telephone companies, the opinion is here set forth: "A brief statement of the leading facts as alleged in the information and admitted or not denied by the plea will afford an understanding of the questions involved, and make our views clear on the questions. The defendant is a corporation formed to do a general telephone, telegraph and district telegraph business. . . . An ordinance of the city of Chicago was passed January 4, 1889, and accepted by the defendant January 10, 1889, which granted permission to the defendant to construct, maintain, repair and operate in the public streets, alleys and public ways of the city of Chicago, for the period of twenty years, its lines of wires by means of underground conduits in part of the city and by means of poles and wires in the streets and alleys and over public grounds in other parts of the city. The grant was upon certain conditions, among which were the following: The defendant was required to file with the comptroller of the city, on the first days of January and July of each year, a sworn statement of gross earnings and to pay into the city treasury three per cent of such receipts. It was also required to file with its acceptance of the ordinance a schedule 'showing the rates charged by said company for telephone service at the date of the passage of this ordinance within the limits of the city of Chicago,' and was prohibited from increasing to its present or future subscribers the rates for telephone service then established. The defendant accepted the ordinance with its terms and conditions, and filed with its acceptance a schedule of the rates then charged for telephone service within the limits of said city. Afterward other territory was annexed to and brought within the limits of the city of Chicago, which had previously been within the limits and under the jurisdiction of other minor municipalities organized as towns or villages, which, upon such annexation, ceased to exist. Those towns or villages had previously granted to the defendant the right to occupy and use the streets therein for its telephone business upon certain conditions contained in the ordinances granting such privileges, but without any limit of time or condition as to rates. As to those streets and grants, the defendant claimed that it had acquired vested contract rights which were not and could not be affected by ordinances of the city of Chicago, and that as to the territory so annexed the limitation of the ordinance as to rates did not apply. One of the principal matters in controversy, therefore, is whether the defendant had a right to continue to charge such rates as it saw fit in such portions of the city as were not within the limits of the city when the ordinance was passed.

"Another question arises out of the improvements in telephone service and the equipment and appliances therefor that have been affected since the ordinance was passed. Since January 4, 1889, when the privilege of using the streets for telephone business was granted great improvements have been made in the means and appliances for conducting the business, one of the most important of which is the substitution of a metallic circuit for the grounded circuit which was in use at that time. The grounded circuit, and the appliances connected with it were not satisfactory, . . . and a method was devised for furnishing a combined local and long-distance telephone service with a single set of instruments, and this was an improved service. . . . The defendant presented to its patrons within the city of Chicago propositions to enter into what they called 'special service contracts,' by which patrons were to have the improved service at higher rates than were charged when the ordinance was passed. . . . The claim of the defendant as to these improvements is that the proper construction of the ordinance only requires it to furnish the same style of service and equipment that was furnished when the ordinance was passed at the rate then fixed, and that it can charge a higher and different rate for better telephone service if the patrons agree to the special service contract.

"The limitation that the defendant should not increase to its present or future subscribers within the city of Chicago, the rates for telephone service then established had no provision restricting it to the existing limits of the city. The words of the ordinance are clear and not ambiguous, and apply to all the territory of Chicago during the period of the grant. The ordinance having been accepted by the defendant became a contract by which both parties were bound, and the territory which has since been annexed to the city is within the city of Chicago. If there had been an intention to restrict the limitations to the existing city limits, such an intention would naturally have been expressed in the ordinance or the acceptance. . . . The ground of defendant's claim that the ordinance does not limit its charges in the annexed territory is that before the annexation the minor municipalities had granted to it the right to occupy the streets therein for its business without any limit as to time. If the grants had been for terms of years under legislative authority authorizing them, and the terms had extended beyond the existence of the corporations granting the privileges, there might be ground for saying that the grants were binding upon the city because they had become binding contracts under which the defendant had vested contract rights for such terms. But they were not for definite terms, and the grants were in consideration of furnishing something to the town or village, such as telephone service to the town or village hall. . . . Such grants cannot be construed to be perpetual, and at most cannot extend beyond the lives of the corporations granting them. Upon annexation, there ceased to be any town or village authorities entitled to the benefits of the contract . . . and it could not have been understood that the grant should constitute a discharge of the obligation annexed to it. But if it were otherwise, and the defendant has the right to maintain its wires and occupy the streets where the towns and villages formerly existed, we do not see how that it can be said that it has the right to occupy the streets of the city as they existed when the ordinance was passed, in violation of the conditions of that ordinance. . . . If the rates for telephone service are increased within the city it is a violation of the contract. . . . The question in the case is the same as in Indiana Railway Company v. Hoffman, 69 N. E. 399, where it was held that the provisions for transfers applied to the territory annexed to the city after the contract was made. . . .

"The next question is whether the telephone service named in the ordinance means the general telephone service furnished by the defendant during the period of the grant, or only the kind furnished when the ordinance was passed. . . . It is true that a corporation may make a special contract with an individual, upon any terms agreeable to both parties, for services which it is not bound to furnish to all.

But that is not the question here. If it be conceded that the defendant is not bound to furnish the improved service to its patrons and may furnish such service under special contract, the individual who has entered into the contract may be bound by it. But that question is of no importance in determining whether the defendant shall be bound by its contract not to increase its rates for telephone service during the period for which it has a right to occupy the public streets. . . . Under the ordinance, the defendant cannot be required to adopt improvements in the service or equipment or to keep up with the general progress in the business, but if it sees fit to adopt improvements and furnish better telephone service, it can only have the benefit of the ordinance granting it the right to use the public streets by complying with the terms of the ordinance and not increasing the rates."

People ex rel. City of Chicago v. Chicago Telephone Company, 77 N. E. 245.

DAMAGES FOR FAILURE TO DELIVER MESSSAGE.

One Alice Atherton lived at the town of Cunningham, Kentucky, some ten miles from Bardwell, in the same state. A sister, Mrs. Hooper, resided at Mayfield some thirty or forty miles distant. The Cumberland Telephone and Telegraph Company operates a line of telephones between Bardwell and Mayfield but there is no telephone connection with the town of Cunningham. To notify the sister at Cunningham of the fact that Mrs. Hooper was dying, a special contract was entered into between the sender of the message at Mayfield and the company's agent at Bardwell that the latter would deliver the message at Cunningham for $2.00. The message was accordingly transmitted to Bardwell, there written out and placed in an envelope and given into the hands of a special messenger to deliver to Alice Atherton at Cunningham. The special messenger promptly went to Cunningham and there learned that there were three Alice Athertons at Cunningham and finally that the one wanted was some eight miles farther distant on a visit. The messenger did not attempt to locate the party at the more distant point but returned home to Bardwell. When the proper party learned of the contents of the message Mrs. Hooper had died. Suit was brought for damages and with the above facts before it, the Court of Appeals has given the following statement of the law as governing the liability of companies in such cases: "The rule which is applied in this state to actions for damages against telegraph companies for non-delivery of messages in certain cases, allowing a recovery for mental anguish, applies with every reason to telephone companies. (South Western Telephone Company v. Taylor, 63 S. W., 1076). The nature of the service to be rendered is quite similar, and in this case was identical with that usually done by telegraph companies. The message was to be transmitted to the end of the company's line, there reduced to writing, and delivered by special carrier to the addressee at a remote point, beyond the company's free delivery limits. The contract in this case was to transmit and promptly deliver the message to appellee at Cunningham, using the telephone line as far as Bardwell, and thence the service of special messenger. It was not to deliver the message unconditionally, or at all events, but to deliver it at Cunningham. The consideration paid was based upon that undertaking. When the messenger with expedition arrived at Cunningham and found that the addressee of the message was not in town, but many miles away, the company had done all that it could do or was required to do under its contract, unless it was to report to the sender of the message the fact that it could not be delivered. Telegraph and telephone companies cannot know the residence of all persons for whom they accept messages. Unless they in fact know, and accept and undertake to deliver the message, although addressee is not within a reasonable free delivery limit of the receiving office, the implication is that that the parties undertook that the sender represented the addressee to be at the point to which the message was addressed, and that the company undertook to use all reasonable diligence and dispatch to find the addressee at that point and deliver the message there. The same rule of construction applies where the company accepts a message to be delivered beyond its line and free-delivery limit; that is, that it undertakes to deliver the message to the person addressed, at the place addressed." The Court refused to hold that it was the duty of the company to report to the sender the fact that the message had not been deliverd. A judgment against the company was accordingly set aside.

Cumberland Telephone & Telegraph Company v. Atherton, 91 S. W. 257.

WHAT IS REASONABLE CARE? GEORGIA RULE.

A recent case from the Georgia courts contains a clear statement of the care that it is incumbent on electrical companies to exercise with reference to the maintenance of their poles in public highways. The testimony brought out the fact that a young lady was passing by a pole belonging to the Savannah Electric Company when it suddenly fell and killed her. The supreme court said in quoting from the charge of the lower court as follows: "The care of a prudent man varies according to the circumstances, dependent upon the degree of danger. What is the precise legal intent of the term 'ordinary care' must in the nature of things depend on the circumstances in each individual case. It is a relative and not an absolute term. The degree of care and foresight which is necessary to use in any given case must always be in proportion to the nature and magnitude of the injuries which will be likely to result from the occurrence which is to be anticipated and guarded against." Defendant's counsel complained that this statement of the law imposed upon the company the exercise of extraordinary care, but the higher court held otherwise, saying: "It is contended that the effect of the instructions was to impose upon the defendant the exercise of extraordinary care. Of course, the defendant was not bound by this high degree of diligence. All that it was required to do in the erection and maintenance of its poles for the protection of travelers upon the street was that degree of care which would be ordinary care under the circumstances." It is doubtless true that the above court would make a distinction if the point were raised and to be applied with reference to the care required in handling electricity itself, and it seems probable that in such case extraordinary care would be required.

Savannah Electric Company v. Bell, 53 S. E. 111.

FAILURE TO MAKE INSULATION TEST A BAR TO RECOVERY.

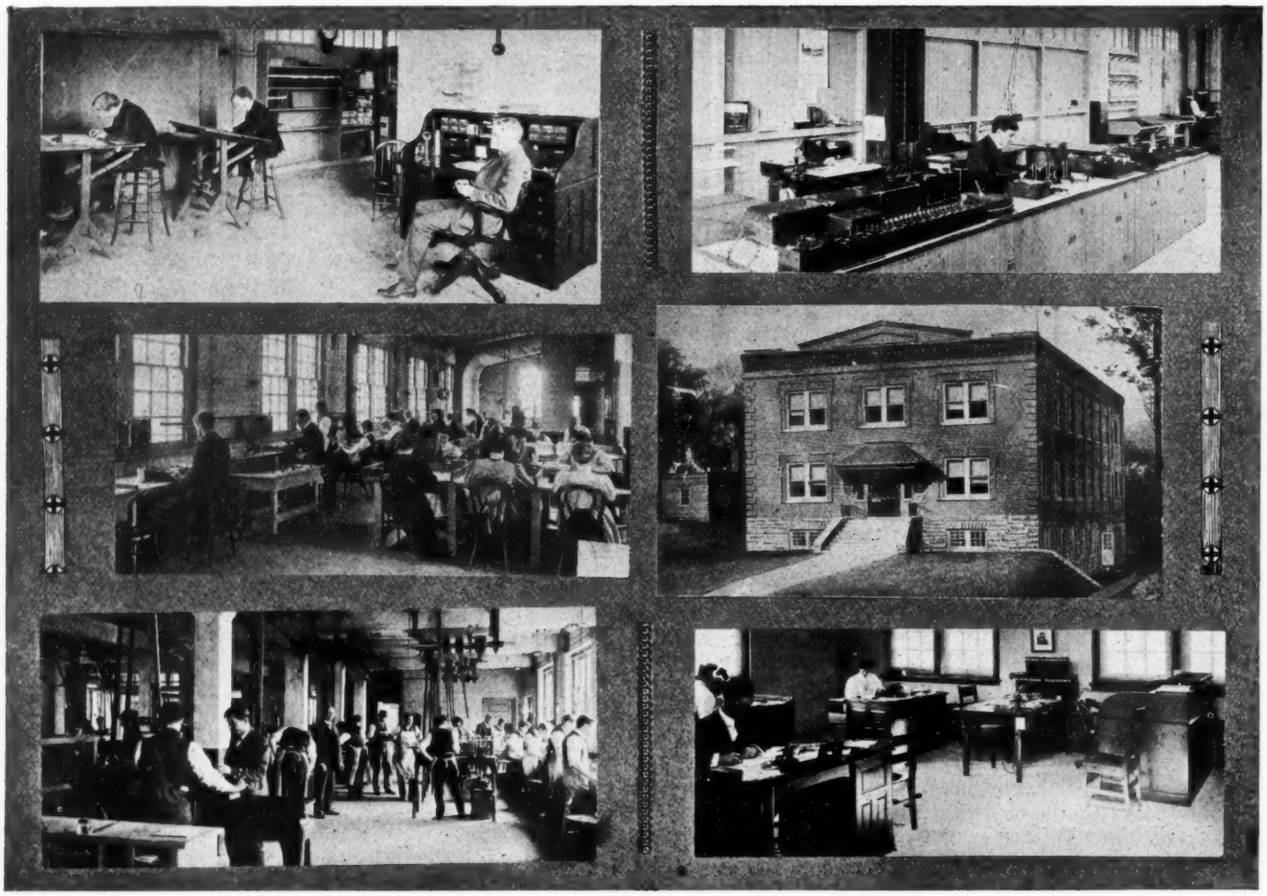
Among the obligations that a telephone company must assume in behalf of its employes is the familiar one that they must be furnished with a reasonably safe place to work. This duty has been held to extend to that of providing the usual means for determining whether ordinary "dead" wires are "live," even though such wires belong to other companies, providing it is necessary for the employe of the telephone company to go about such possible live wires in the performance of his duties. This duty has been discharged if the ordinary apparatus has been furnished the employe for discovering whether there are leaks. In the following case an experienced lineman in the employ of a telephone company received a shock because of the "live" condition of a guy or span wire belonging to an electric railway company, which would have been "dead" but for a defect in the insulator or circuit breaker. It was held that he was guilty of contributory negligence and could not recover damages from the telephone company, he having failed to make an insulation test with the instruments furnished him.

Bergin v. Southern New England Telephone Company, 38 Atlantic 888.

MANUFACTURERS DEPARTMENT

NEW PLANT OF THE LEEDS AND NORTHRUP COMPANY.

The rapid growth of the Leeds and Northrup Company of Philadelphia is indicated by the accompanying illustrations, which show the new quarters recently occupied by this firm. The building was designed and built to meet the special requirements of constructing and adjusting electrical measuring instruments. It has embodied in it many features of interest. The location at 4901 Stenton avenue is away from the thickly settled part of the city and has, therefore, all the advantages of ample light and freedom from dust.



Interior Views and Factory of the Leeds and Northrup Company, Philadelphia.

In selecting the site for location, a lot of sufficient size to allow for future expansion was acquired.

The main structure is 110 by 52 feet, three stories in height, fireproof in construction throughout and has all provision for the comforts of the employe.

The laboratory occupies 85 feet of the third floor, and by means of skylights in addition to numerous side windows, an abundant supply of light, so essential for work of precision, is furnished. The illustration shows the north side, which is practically a duplicate of the south side. Careful study has been given to the arrangement, distribution and insulation of the circuits for use in current, potential and general testing work. This current is furnished by a large battery of storage cells, the terminals of which are connected to a specially constructed mercury switchboard. This switchboard permits grouping the cells in any desired combination for any particular circuit. The battery room is shown at the end of the laboratory, on the right, with the charging panel outside. The mercury switchboard is not visible. All calibrating and standardizing apparatus is permanently set up in circuit with galvanometers best adapted for the demands to be made upon them. It will be noted from the illustration that the type "H" galvanometer is extensively used.

In conjunction with the laboratory, but in a separate building, provision has been made for work in high temperature measurement.

The shop occupies 85 feet of the second floor, and is electrically driven. The equipment of tools and machines is specially adapted for the production of electrical measuring instruments. Co-operating with the shop and laboratory is an inspection department through which all apparatus must pass before shipment can be made. This inspection is most rigid, involving both mechanical and electrical tests, and thus insures the highest standard of workmanship, material and adjustment.

The basement is taken up by the heating and lighting plant, shipping room, locker room and wash room for the mechanics, fireproof vault for records and a well-lighted room 52 by 55 feet for future manufacturing purposes.

The drafting and designing department is located on the second floor so as to be in close touch with the shop. In this department are filed accurate records and drawings of all apparatus manufactured. The sales office, stock room and show room are located on the third floor. In the show

room are displayed, in easily accessible wall cases, a complete line of the more important instruments manufactured. In addition to this display a number of instruments are connected in circuit for demonstration under actual working conditions.

The occupancy of the new shop and laboratory has permitted the installation of additional machinery and an increase in their mechanical and laboratory forces. As a result, a larger amount of manufactured stock and standard parts will be carried, which will insure prompt deliveries.

A cordial invitation is hereby extended to all interested persons to visit and inspect the new plant of the Leeds and Northrup Company.

DEAN PRIVATE BRANCH SWITCHBOARD.

The accompanying illustration shows the front view of the Dean No. 16 type, two position, common battery board for private branch use for small exchanges up to 300 lines. This style of switchboard is particularly adapted for extremely rapid operation, and when one is needed to present a very neat appearance. The cabinet is furnished in best quarter-sawed oak or solid mahogany as desired, both front and rear panels are removable by releasing the flush ring catches, which hold them in place, this construction making access to all the apparatus a very simple matter, the key shelves are made five ply, with the grain of the wood of alternate layers laid crosswise so as to prevent warping. They are hinged and held in place by a very substantial spring lock, thus allowing the wiring to be readily inspected. Space is provided on the key shelves so that a four-party line ring and combined listening key can be installed in each cord circuit if so desired. The plug shelf is covered with one-eighth inch polished leather to prevent noise in operating, and wear on the cords and plugs, also the key from marring the cabinet. The key for switching the hand and power generators is conveniently located on the key shelf to the right of each operator, and so arranged that only one generator, either hand or power, can be connected at any one time. The hand generator for each position is mounted in the rear of the cabinet with an extension shaft projecting to the front through an escutcheon to the crank as shown in the view, thereby making it readily accessible as well as convenient for operating. The switch controlling the night alarm bell is wired to ring whenever a line or supervisory relay is operated. Line and supervisory signal pilot lamps are provided at each position. The operator's breast plate transmitter set shown in the view consists of the well-known Dean long distance type transmitter and receiver with a hard glazed cotton cord, connecting to a plug, which is inserted when in service, in one side of the operator's twin jack shown in the space below the keyboard, this jack is so constructed that when the plug is withdrawn the operator's circuit is automatically opened. This type of talking circuit has become very popular on account of its great convenience and reliability. The line relays can be mounted if necessary in the rear of the cabinet, but they are more convenient for inspection and less liable to damage by their weight, when shipping, when arranged to be mounted on a separate rack outside of the switchboard.

All wiring on this switchboard is brought down by means of specially formed cables to connecting racks contained in the rear of the cabinet; to these connecting racks all line wires are led; the construction being such that the connecting rack is readily accessible at any time without interfering in any way with the mechanism of the switchboard. The equipment in this cabinet is the same as used on the Dean larger multiple switchboards and which has proven to be so successful. The entire apparatus is claimed by the company to represent the highest standard of excellence, fulfilling satisfactorily the most exacting demands for modern high-class switchboards of this size.

Dean No. 16 Type Two Position Common Battery Private Branch Exchange Switchboard

THE STANDARD SPECIALTIES.

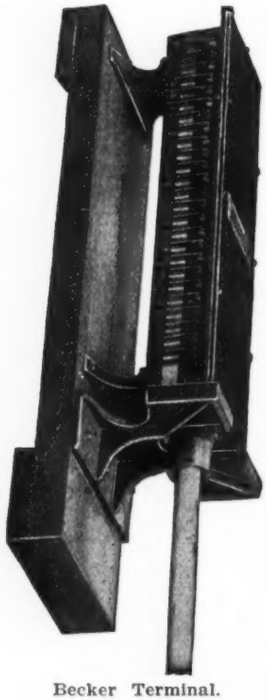
The Current Electric Company, Chicago, reports a big demand for its Standard pole changer and Standard duplex set. The company guarantees absolute satisfaction to all purchasers and insures immunity from patent litigation of every description.

The mechanism of the Standard pole changer is built on the inside of a highly finished quarter-sawed oak case with

the binding posts and switchboard on the outside. To observe the interior one has simply to turn it over; there is no glass to remove or get broken. It will work in all positions. Dimensions are 6 x 8 x 4 inches; weighs three and one-half pounds. It is claimed by the manufacturer to be economical and convenient, as it takes but one battery to operate it. Its present price is but $15.00, and it will be sent on thirty days' trial to all responsible parties. The other telephone specialty manufactured by the Current Electric Company is the Standard duplex set which sells at the same price and on the same conditions. Standard duplex sets are made for, and extensively used on metallic bridging lines, metallic toll lines, trunking lines, etc., as they render one or more additional talking and ringing circuits, according to the original number of circuits and the number of instruments used, without cross-talk or disturbance to the original lines.

BECKER CABLE TERMINAL.

The protective devices manufactured by the Central Telephone and Electric Company, of St. Louis, afford ample protection for telephone circuits, are made in all combinations and have an advantage in that they have demonstrated their efficiency by time tests. This concern has been manufacturing for eleven years and keeping well abreast of the times, making such changes and improvements as experience has deemed advisable. The line offered covers both individual protection for telephone instruments, protection for cables of all types, and a complete line of switchboard protection. The company is thus in a position to furnish the entire equipment uniform in design and quality.



Becker Terminal.

The Becker pressed steel cable terminal is especially adapted for use with paper cable. It is in use in many up-to-date exchanges, and, being different from any other device of its kind on the market, is so practical in design as to appeal immediately to the trade. The Becker cable terminal is made of one-eighth inch pressed steel, making a neat, light and substantial terminal head. The twenty-five pair complete weighs only twenty pounds; fifty pair weighs thirty pounds; seventy-five pair weighs forty pounds; one hundred pair weighs fifty pounds. These terminals are made either plain or fused as desired, the special fuses used with this terminal

Central No. 1 Fuse Used with Becker Terminal.

being the Central No. 1 patent wrapped, which combines the choke coil effect with a multiplicity of discharge points. The fuse is six times as long as any ordinary type, is wrapped eight times around the mica, giving eight discharge points one-sixty-fourth inch from the ground plate directly above the fuses, thus affording ample protection against lightning, trolley, or electric current. The lid is screwed to the terminal head, being made water and air tight by a rubber gasket, without the use of a compound. The terminal may be filled with compound, if desired, the screw plug at the top being used for this purpose. Spider wires are allowed ample space and do not cross the fuses; cable pairs are soldered directly into the end of the distributing terminal connection, making a perfect and continuous connection to the fuse. All insulation is of the best grade of hard rubber, held firmly in place by thread and lock nut; there is no possibility of turning or loose connections with this terminal head. Fuses are easily replaced in the German silver fuse clips by a simple lifting of the cover without disarranging any wiring. Self-soldering nozzles are furnished on all Becker cable terminals. The price, the company states, is lower than charged for any other high-grade cable terminal.

The Central Telephone and Electric Company is always glad to furnish catalogues to prospective buyers of protective devices, and to quote prices, although it desires to call the attention of the trade to the fact that its equipment is handled by up-to-date jobbers everywhere. Shipments are made promptly either from jobbers stock or direct from the factory.

A NEW CIRCUIT CHANGING SWITCH.

A small circuit changing switch, designed originally to meet the requirements of the United States Signal Service in field manoeuvers, contains so many excellent features not usually found in switches of this kind that it has been adopted by the Sterling Electric Company for use on all of its equipment where a two-point switch is required. The base is cut from a solid piece of hard rubber, which affords the highest possible insulation between the terminals. The contact with the lever is not only made over a machine-cut stud of large size, but a strong spring contact pressing down against the upper side of the lever holds it firmly against the stud, and by means of this knife blade contact, reduces contact resistance to such a small amount that it is possible to carry a current of thirty amperes without danger from overheating. For switchboard circuits, gas engine or even small storage battery work the company claims this switch cannot be excelled.

TELEPHONES FOR ALASKA.

The accompanying illustration shows a rack of telephones in the factory of the Chicago Telephone Supply Company, Elkhart, Indiana. The particular lot of telephones shown

A Rack of "Chicago" Telephones for Shipment to Alaska.

were for shipment to Alaska where the company's apparatus is installed in a number of the principal exchanges.

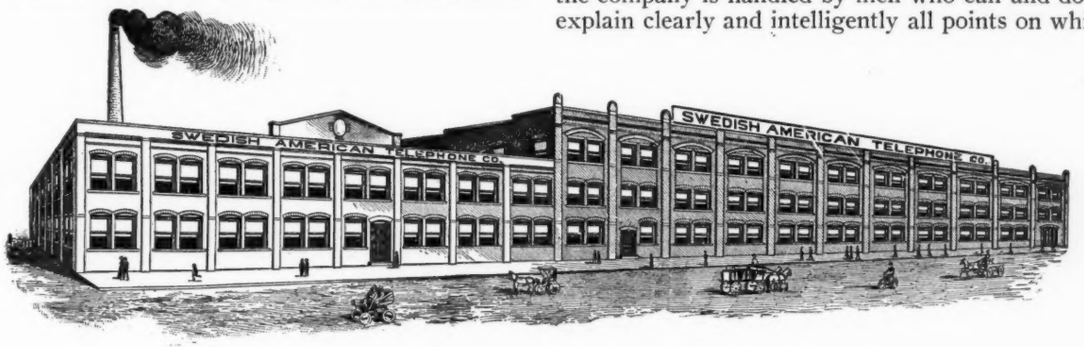
LINE HARDWARE FOR TELEPHONE WORK.

The Norton Tool Company of West Park, O., furnishes anything which telephone companies may want in the shape of line hardware. This firm has earned an enviable reputation throughout the telephone field because of the quality of its goods and the excellence of its service. Among the articles it manufactures are: Cable hangers, messenger hangers, anchor rods, cross-arm braces, washers, clamps, struts, lag screws, double end bolts, brackets, pole rings, pole steps, pole shims, guying shims, carriage bolts, machine bolts, etc.

All of the galvanizing of the Norton Tool Company is done by the hot dip process, and every article turned out must have a tensile strength of not less than 48,000 pounds per square inch of section with elongation of not less than fifteen per cent in eight inches. All of its goods are guaranteed and prompt deliveries insured. Telephone companies in need of such supplies are invited to send for samples and prices.

NEW SWEDISH-AMERICAN FACTORY.

We illustrate on this and the following pages exterior and interior views of the Swedish-American Telephone Company's new manufacturing plant, which is owned and occupied by the company. It is located at 1748-1780 East Ravenswood Park avenue, Chicago, Summerdale station, on the Chicago and Northwestern Railroad, an ideal location for manufacturing purposes. As shown by the illustration, the building faces on three streets and an alley, thus insuring perfect natural light, a feature of much value in manufacturing plants. This building contains about 200,000 feet of floor space, all of which is devoted to the exclusive manufacture of telephone equipment—telephones for exchanges, for rural and party lines, central energy telephones, switchboards, telephone and switchboard parts and appliances. The factory is equipped throughout with new and improved machinery and every modern appliance that will facilitate work and produce results. In fact it is a model plant in every particular. Each department is under the direct supervision of men of the highest ability, who thoroughly understand their business and who at all times have a watchful eye that no detail of construction be overlooked. Each department is further provided with testing rooms where each and every part and piece is given a thorough and most rigid test for strength, uniformity conductivity, etc. This work is done by men of ability and it is their duty to see that no parts that are in the least defective are allowed to pass. The Swedish-American Telephone Company is a manufacturing concern in every sense of the word, making the finished product from the raw material throughout, and its output represents as good equipment as skilled workmen can produce. This fact is attested by hundreds of successful Independent exchanges and telephone organizations throughout the United States who use the Swedish-American apparatus exclusively.



New Factory of the Swedish-American Telephone Company, Chicago.

This company has within the past few years built up a large business. It was organized in November, 1899, and its success is a tribute to the excellence of the product. The company's first plant was located on North Wells street, Chicago, where it started in a small way to supply the Independents with high-grade telephone apparatus. The telephone buying public was soon convinced that the Swedish-American had come to stay and that its product was modern and up-to-date.

The company states it was the first to issue a guarantee as to the efficiency and reliability of its product and the telephone buyers were not slow to recognize the importance of a guarantee. That the policy of the company has been correct is plainly apparent. Close attention to its customers' requirements and a willing-to-help-you-out feeling has been characteristic of the Swedish-American since its organization.

The affairs of the company are in the hands of men of long telephone experience and its customers' wants are cared for on a good, sound, practical, common sense, business basis. In the illustrations on the pages following will be found the general offices of the company and the private offices of the department heads, where an immense amount of mail is daily received and sent out, the company making it a rule to answer all correspondence the same day it is received, when possible so to do. The correspondence of the company is handled by men who can and do answer and explain clearly and intelligently all points on which information is desired. A direct Western Union wire has been installed, an operator being employed to receive and dispatch messages. The volume of telegraph orders daily received is surprisingly large. The installation of a direct Western Union wire is simply additional evidence that the company is always abreast of the times and takes advantage of every facility to further the interest of its customers.

The illustrations following show different department views giving a general idea of the size and completeness of the plant. Telephone men visiting Chicago will add to their fund of telephone knowledge by calling on the company and going through the factory, seeing the progress of manufacture from the raw material to the finished product. The real work, energy, ability, time, money and appliances required to produce telephone equipment of the Swedish-American quality is hardly understood or appreciated by the average exchange manager or telephone buyer, and a trip through the factory is a liberal telephone education in itself. The plant can easily be reached by Chicago & Northwestern local train to Summerdale station.

In addition to its Chicago plant the company has established branches at Omaha and Kansas City. The former being located at 615 Bee building and in charge of F. M. Ferguson. The Kansas City branch is located at 115 West 6th street, where a large and complete stock of Swedish-American apparatus is carried, shipments being made the same day the order is received. This branch is in charge of W. O. Rhode. Both Mr. Ferguson and Mr. Rhode are men of wide experience in the Independent field, and look

Interior Views of the Swedish-American Telephone Company's New Factory.

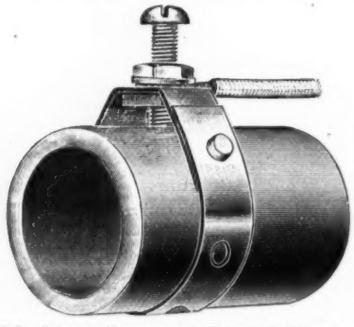
Interior Views of the Swedish-American Telephone Company's New Factory.

after the wants of customers at the above-named points. This spirit of enterprise and progressiveness is in keeping with the past history of the company and its ever-readiness to provide for its friends and customers not only the highest type of equipment, but facilities to deliver same with the least possible delay.

At the coming National-Interstate convention, to be held in Chicago at the Auditorium, June 26, 27 and 28, the company will be located in Room 612, where it will exhibit a complete line of apparatus. In addition to this the company will introduce several new and novel features in telephone devices.

NEW GROUND CLAMP.

George R. Blackburn, Cleveland, Ohio, calls attention to the new improved ground clamp which he is placing on the market and known as No. A1. It is similar to the original Blackburn No. 1 in that it has the screw contact but is designed so it can be attached without disengaging any of its parts thereby saving time as well as the danger of losing the separated part. Referring to the illustration it will be seen that the perforated band encircles the pipe while a hole in the band engages a pin formed at the opposite end. The angle at which this pin projects makes it impossible to be disengaged after having been tightened by the screw, on the contrary the tighter the band is drawn around the pipe the more secure the pin is engaged in the hole. A special protective foot is provided for the screw when it is desired to connect a ground to a lead pipe which is not generally recommended in telephone practice. This improved clamp is meeting with universal favor among telephone engineers who have seen it and is being specified as a standard equipment for several large Independent and Bell companies. George R. Blackburn will be pleased to furnish prices and samples to the trade.



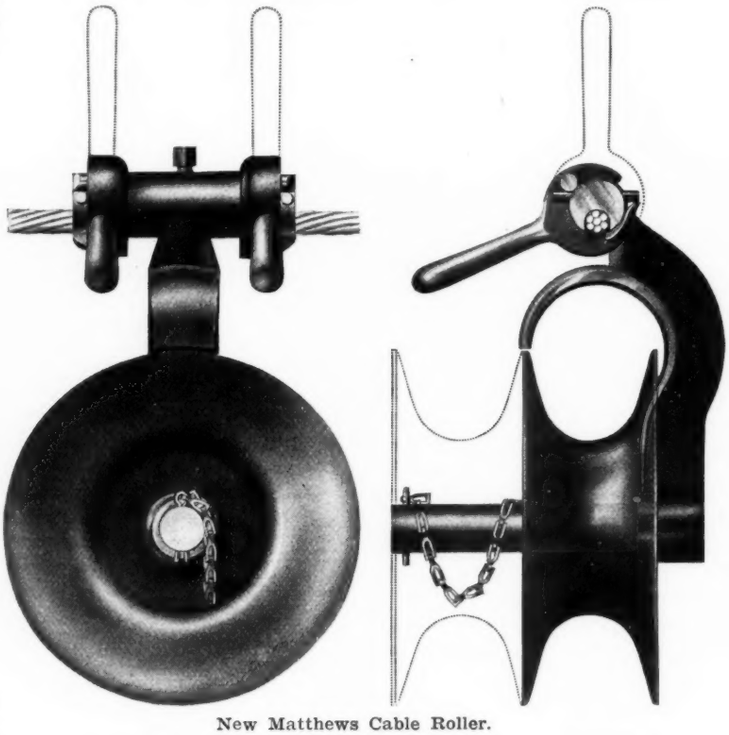
Blackburn Improved Ground Clamp.

DEAN CONTRACTS.

The Dean Electric Company, Elyria, Ohio, has recently received orders for the following common battery switchboards: Farmers' Mutual Independent Telephone Company of Everett, Washington, one multiple switchboard, three thousand line ultimate, equipped for nine hundred and sixty local and thirty rural lines, and to be equipped with the Dean harmonic system. This contract also calls for one multiple toll section, and complete power plant with a harmonic converter. The Niagara County Home Telephone Company, Tonawanda, New York, one multiply switchboard of three thousand line ultimate, with eight hundred local and thirty rural lines equipped. This switchboard will be equipped for the Dean full selective party line system with duplicate harmonic converters. Seneca County Home Telephone Company, Seneca Falls, New York, for one thousand line Dean full multiple, equipped with three hundred and twenty local and twenty rural lines. West Shore Home Telephone Company, Catskill, New York, one thousand line Dean full multiple and equipped for three hundred and twenty local and twenty rural lines. The Clinton Telephone Company, Plattsburg, New York, the first exchange installed by the Dean Electric Company, has placed an order for one hundred and sixty additional capacity and changing from multicycle ringing machines to the Dean harmonic converters. The Inter-State Telephone Company, Little Falls, New York, to change a six hundred line board to Dean harmonic selective four-party system, changing all the key shelves, keys and plugs and installing a Dean harmonic converter. The Shelby Telephone Company, Shelby, Ohio, for fifteen hundred line multiple switchboard, equipped for five hundred local and sixty magnetic lines. This switchboard is to be completely equipped for Dean harmonic selective party line system, with power plant and duplicate harmonic converters. Covington Home Telephone Company, Covington, Ohio, has placed an order for a four hundred and fifty line Dean Express type switchboard. Besides the larger boards sold, contracts are being signed daily for one and two position switchboards of the different Dean types.

NEW CABLE ROLLER.

Through the courtesy of the manufacturers, we are enabled to reproduce herewith an excellent cut of a new cable roller or "trolley," patents for which have recently been applied for by William Callahan, for many years connected with the Central Union Telephone Company in the capacity of cable superintendent, and now with a new Independent company building on the Pacific coast.



New Matthews Cable Roller.

In the design of this roller, Mr. Callahan states that he had in mind simplicity, quick action, safety, strength, convenience, weight, and, most important of all, the saving of time and labor.

Keeping these points in view, he has perfected a roller that is instantaneous in action; that will fit all sizes of messenger wire; that has no clamping bolts and nuts to cause trouble and waste time; that is made of malleable iron and only has four parts, not including the pins; that only weighs eleven pounds.

To use the Callahan roller, simply turn up the handles as shown by the dotted lines and drop it over the messenger;

turn the handle down as shown. This action clamps the device securely to the wire. If a small messenger is used, tighten the set screw at the top. To insert the cable in the roller, remove the inside cotter pin and slide the wheel out. Drop in the cable and slide the wheel back and replace the pin. You are now ready to pull your cable through, without fear of its jumping out of the sheave wheel or becoming injured in any other manner. The inventor states that he can put up any size cable, by means of a set of these rollers, as fast as a team of horses can walk.

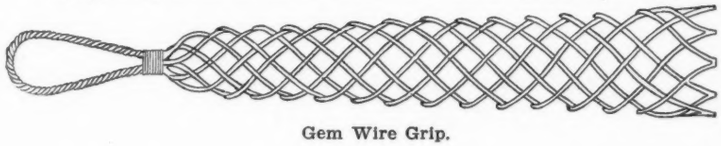
Mr. Callahan has recently disposed of his patent rights to the well-known firm of W. N. Matthews & Brother, 226 North Second street, St. Louis, the gentlemen who have made the Stombaugh guy anchor famous. They will be pleased to give further information regarding the Callahan cable roller.

THE COLMAN J. MULLIN "GEM" WIRE GRIP.

Colman J. Mullin, of 430 Kent avenue, Brooklyn, N. Y., is offering the telephone trade a very attractive device in the shape of the Gem wire grip. This is aptly described in Mr. Mullin's circular as "a superior comealong, which demonstrates its effectiveness by the pull you have."

The grip as shown by accompanying illustration, will readily appeal to practical engineers. Its simplicity of application and operation makes it a boon to contractors who employ wiremen to pull wire or haul cables into ducts or conduits. It is claimed for the Gem grip that "it slips on in one second; you pull; it cannot slip. When you have hauled your cables or wires, you slip it off in one second. No skinning or insultaion, no solder, no tape, no loss of wire, and finally it grips."

Mr. Mullin claims that all other types of device involving this principle are an infringement on his patents, and accordingly, as per his advertisement on another page, warns pur-



Gem Wire Grip.

chasers thereof. He also states that he has manufactured this device for three years, and thus has gotten beyond the experimental stage, while out of the thousands of them sold not one has yet been returned as being unsatisfactory, or as having lost its grip during a pull. It is said that the Gem wire grip has been adopted to the exclusion of all other methods by some of the largest eastern Bell telephone companies. In fact, the largest telephone company in the world is said to have used close onto a thousand for pulling its trunk line between New York and Philadelphia.

The importance of this device in such cases can be readily appreciated from the fact that its pull is 700 feet and the cable weighs on an average of nine pounds to the foot, to say nothing of the friction of the cable against the sides of the duct.

One great advantage claimed for the Gem wire grip over other methods is that its flexibility permits of a continuous pull, from the start until the cable is fully inserted in the conduit. This can be appreciated best by taking into consideration the tremendous strain which is put upon the cable in order to get the necessary slack after once the cable has entered the manhole to which it is being pulled.

The Gem pulls No. 14 duplex as well as larger wire or any number together and it is said to be especially useful in pulling two or three wire feeders. The thirty-six inch length is the size commonly employed by telephone and power companies for long and heavy pulls.

Mr. Mullin also manufactures a slip grip with double eye, which can be applied with sectional cable over aerial or for pulling out instead of the half hitch marline usually employed; also, a double eye for aerial pulls that can be slipped over pins and which has many other advantages.

In addition to cable grips, Colman J. Mullin also manufactures Wizard winches, mandrel conduit cleaners, Perfection reel supports or jacks, rigid uprights, multitype sheaves to prevent crushing of cable, and various other devices, all of which are fully described in circulars, issued gratis to the trade.

INTER OCEAN ADVERTISING.

The Inter Ocean Telephone & Telegraph Company of Buffalo, New York, has been doing some advertising of the kind that brings results. The campaign being made by the company for new business and to serve well its present large list of subscribers has been an aggressive one. In speaking of the plan of the company Mr. William A. Wadsworth of the toll department says:

"We furnish bulletins of all ball games by innings to every town in the nine counties in this territory, deriving considerable revenue. This, I believe, is the first time a telephone company has successfully competed in every detail with the Western Union Telegraph Company's ticker system. In addition to this we have a display card to put in windows of all places receiving the returns, displaying a large official shield with the words "Base Ball Returns Daily Over Independent Lines of Inter Ocean Telephone & Telegraph Company's Long-Distance Service." We have been extremely successful in this venture, and have inaugurated many new methods of advertising the fact that subscribers to our system can reach over 75,000 telephone users in western New York that cannot be reached by any other system. We give better rates, better service and better treatment than telephone users have had heretofore and we want to advertise the fact."

KEEP SMILING—WITH CASS.

During the recent convention of the Michigan Independent Telephone Association, held at Ann Arbor, all the telephone men in attendance wore on their coats a card with the very happy suggestion to "Keep Smiling With

Keep Smiling

WITH CASS
Nagel Electric Co.'s Man.

Cass, Nagel Electric Company's Man." The Michigan State Gazette, a publication issued by the Michigan Bell company for distribution among its agents and employes, comments on the card and reproduced the phrase "Keep Smiling," but failed to say "With Cass, Nagel Electric Company's Man." The Gazette tries to convey the idea that it is necessary to remind Independents to keep similing or they would become blue and despondent. The truth is that the Bell has constant need of the admonition, as the Independent success all over the country has so materially cut into its business and revenue that the "opposition" is becoming a serious problem among Bell companies. The Nagel company has hit on a novel bit of advertising and its card is a good one.

TRADE NOTES.

DINSMORE & LAWTON, manufacturers of D. & L. electric flashers and electrical specialties have moved to the Omaha Building, 134 Van Buren street, Chicago.

THE AMERICAN VITRIFIED CONDUIT COMPANY of New York city removed its offices on May 1st to the Fuller Building, Broadway, Fifth avenue and Twenty-third street.

W. H. CRUMB & COMPANY, Chicago, Ill., announce the removal of their office to 1041 First National Bank Building. The new telephone number will be Central 3680.

POCKET METER COMPANY, Bluffton, Ohio, has issued a leaflet describing its line of voltmeters, ammeters, and volt ammeters. The company guarantees its line of meters and requests prospective purchasers to write for prices and printed matter.

THE WESTERN TELEPHONE MANUFACTURING COMPANY, Chicago, is sending to the trade Bulletin No. 30, which illustrates the company's line of switchboards. Illustrations of the different switchboards are given as well as detailed parts. The bulletin will be sent upon request.

THE GENERAL ELECTRIC COMPANY, Schenectady, N. Y., has recently issued its fourteenth annual report, which not only covers the business for the past year but gives a report of each year since 1901. The report is very complete, and shows the progress of the company in detail.

THE BAIRD MAGNETO SECRET SERVICE SYSTEM is fully described and illustrated in a folder recently issued by the Baird Manufacturing Company, Chicago. Beside a number of wood cuts the folder contains diagrams which are explained in detail. The folder will be sent upon request.

CATALOGUE E, issued by the Western Telephone Manufacturing Company, Chicago, illustrates and describes the company's line of magneto telephones and small apparatus. It is printed in colors and shows many detail illustrations, with descriptive matter. The catalogue will be sent upon request.

SWEDISH-AMERICAN TELEPHONE COMPANY, Chicago, is out with a mailing card showing its new factory building which contains 200,000 feet of floor space devoted exclusively to the manufacture of telephones and central office equipment. The factory is owned by the company and is one of the most modern plants in the telephone field.

THE UNITED STATES COIN REGISTER COMPANY, Toledo, Ohio, has issued a very attractive catalogue in colors illustrating and describing the company's complete line of cash registers and pay stations for telephone service. The company will be glad to send this catalogue upon request and quote prices on recording measured service devices.

F. L. MARTIN has resigned his position as advertising manager of the Stromberg-Carlson Telephone Manufacturing Company of Rochester and has returned to Chicago, where he will be associated with White's Class Advertising Company, making a specialty of telephone advertising, with which his experience makes him especially familiar.

MCROY CLAY WORKS, Brazil, Indiana, and Chicago, on its last blotter has an old poem entitled "When the fever's in the blood," which is particularly appropriate to the spring season. These blotters are looked forward for each month, as each one contains something good. The company will be glad to mail the blotters as issued to those interested.

THE FRENCH BATTERY COMPANY, Madison, Wis., announces the removal of all of its manufacturing from Chicago, Ill., to Madison, Wis. The company will retain an office and salesroom at 69 Wells street, Chicago, but its main office and factory will be established at Madison. The company announces a very gratifying demand for the "Fleur de Lis" dry batteries.

BAIRD MANUFACTURING COMPANY, Chicago, has issued an attractive folder on the Midgetphone, a new Baird creation. This telephone will be furnished in either series or bridging and in any form of wiring known to modern telephone practice. The Midgetphone is more compact than the smallest telephone and yet all the parts are of standard size. The company will be glad to send descriptive matter and prices upon request.

THE TELEGRAPHONE SIGNAL COMPANY, of Alliance, O., has purchased the Chief Aungst patent system which consists of simply connecting its alarm boxes to telephone lines wherever they may be for the transmission of fire, police and night-watch service, both public and private, direct to headquarters wherever same may be. This system is claimed to be the most practical and economical system now on the market. The Telegraphone Signal Co. install the systems.

THE MANHATTAN ELECTRICAL SUPPLY COMPANY, New York city, has ready for distribution its catalogue No. 21. This contains 736 pages, describing and illustrating practically every piece of apparatus in use for electrical work. The catalogue is supplemented by a carefully arranged index to the list numbers, and a general index alphabetically arranged, covering twenty-four pages. The book is well printed, is six by nine inches, and is substantially bound between boards and a tough buckram cover.

THE TRUMBULL ELECTRIC MANUFACTURING COMPANY, Plainville, Ct., has ready for distribution a handsome catalogue descriptive of its electrical wiring supplies. This catalogue illustrates, describes and gives the prices of switches, cutouts, rosettes, combination switches, weatherproof sockets, flush receptacles, porcelain base switches, cord adjusters, pendant switches, switchboards, panelboards, iron service boxes, panel cutouts and fuse blocks. This catalogue is designated as No. 6, and will be sent to anyone interested upon request.

THE AMERICAN CONDUIT COMPANY, Los Angeles, Cal., announces the removal on May 1, 1906, of its Chicago offices to more central and more commodious quarters in the Marquette building, where Mr. A. L. Waterbury, general manager of the sales department, will be glad, as in the past, to receive the friends and patrons of the company, and where all inquiries by mail or otherwise will receive prompt and careful attention. The increase in the business of the American Conduit Company is decidedly gratifying, and gives satisfactory evidence, both by the volume of business and the class of customers served, that the merits of bitumized fiber conduit as an underground conduit have had

practical demonstration and are being accepted with rapidly increasing favor.

ACME ELECTRIC AND TELEPHONE COMPANY, Chicago, has issued "The Blue Book of Telephone Information," which contains a brief history of the telephone; material to be used in line construction, installation of bridging telephones; telephone troubles and how to find them, etc., as well as illustrations and descriptions of Acme apparatus. Telephone managers are requested to write for the book, which will be promptly sent to any address without cost.

THE NATIONAL AMERICAN TELEPHONE COMPANY, of 141 South Clinton street, Chicago, announces a complete line of new and high-grade telephone apparatus and accessories. This firm manufactures and installs complete outfits for exchange work, and also specializes in the line of private branch exchange equipment and intercommunicating apparatus. Another special feature, upon which particular stress is laid, is their linemen's test set, which has been subjected to the most thorough tests and has proven a very superior device.

THE CENTRAL ELECTRIC COMPANY, Chicago, has recently sent out to the trade a new price list and discount sheet, dated April. This price list applies to the company's 1906 general catalogue No. 24 and contains the very latest prices in force on all electrical material. Special attention is called to the fact that new prices are quoted on D. & W. enclosed fuses and safety devices for which the Central Electric Company is general western agent. This price list should be in the hands of every purchaser of electrical material and any buyer who has not received a copy should write for one.

THE BAIRD MANUFACTURING COMPANY has added two large companies to its list of lock-out telephone users within the past few days. The Ashtabula Telephone Company, Ashtabula, Ohio and the Cedar Rapids and Marion Telephone Company, Cedar Rapids, Iowa, having adopted the Baird secret service system on their rural lines in order to obtain more effective transmission and cut out rubbering. In its new quarters at 1503 Briar place the Baird company is turning out pay-stations and telephones in large quantities and rapidly becoming an important factor in the trade.

THE NORTH ELECTRIC COMPANY has opened a branch office and warehouse at Kansas City, Missouri, where it will carry a large stock of telephones of all kinds, switchboards, construction material and miscellaneous supplies. This branch is in addition to the Dallas branch office and warehouse at Dallas, Texas, and is made necessary in order to take care of the rapidly increasing business in the states adjacent to Kansas City. The company is now prepared to make shipments from Kansas City. The Chicago office of the North Electric Company has been discontinued. Business west of the Mississippi river will be handled from the Dallas and Kansas City offices and warehouses, and that east of the Mississippi River will be handled as heretofore from Cleveland.

THE MANUFACTURERS' ADVERTISING BUREAU, which has been located on Liberty street for many years, has removed to 237 Broadway, New York City. The Bureau has been established since 1877 and has made a specialty of electrical equipment, machinery and engineer's supplies advertising for many years. For some time the Liberty street offices have become cramped for space and it is in order to meet the demand for more room and better facilities that the change in location has been made. The Bureau intends to somewhat broaden the scope of its work and while particular attention will be given to advertising in the trade and technical journals as heretofore, it will also be equipped to handle advertising in the newspapers, magazines and all others periodcals as well.

IT IS CLAIMED that one of the most popular carbon blocks made is No. 402, manufactured by the American Electric Fuse Company, Muskegon, Michigan. It is designed for use out of doors, mounted either on the house or pole. The carbons are extra large, affording plenty of discharge surface. The wires lead up through the porcelain base to heavy terminals and the whole is covered by a galvanized iron cover making it absolutely weather-proof. The bracket is steel, tinned and absolutely rust-proof. In fact, the block is practically indestructible and will outlast any part of the telephone plant. Although the fuse company is receiving large orders for this block from all parts of the country it is able to ship all orders promptly. This is made possible because of increased manufacturing facilities.

W. J. BURNS, of 163 Randolph street, Chicago, invites correspondence from the manufacturers and dealers of the telephone and electrical fields regarding his line of materials and supplies. Mr. Burns represents several of the leading manufacturers of telephone and switchboard cords, switchboard wires and cables, telephone mouthpieces and receiver shells; also Remy imported magnet steel and other electrical specialties and raw materials employed in the manufacture of electrical goods. Mr. Burns is widely known and well liked throughout both the telephone and electrical fields, and having enjoyed extensive experience from the standpoint of both purchasing agent and sales agent is unusually well equipped to give his customers superior service. All correspondence, inquiries and orders will receive his prompt and careful attention.

THE INDIANA STEEL AND WIRE COMPANY, Muncie, Indiana, has recently printed and has ready for distribution its revised price list on its line of telephone and telegraph wire, also several circulars calling attention to the excellence of the company's product and giving letters on what others say about it. Its line of printed matter is very complete, and will be mailed to anyone making inquiry. The company's mill has been running day and night since last September, and from present indications it will, in all probability, be necessary to operate day and night for the entire year in order to make prompt shipment of all orders as received. Some of the leading jobbers and supply houses handle the company's wire and many of the large operating telephone companies use it with most satisfactory results. Prospective buyers are requested to write for prices.

THE TELEPHONE COMPANIES throughout the country have shown their approval of the can top terminals manufactured by the American Electric Fuse Company of Muskegon, Michigan, by flooding it with orders. Within the last thirty days orders for over 2,000 terminals, ranging in size from five to fifty pair, have been received, and with the greatly increased facilities the company is enabled to ship every order promptly. The large line of protectors of this type give such a choice that every telephone engineer can find the terminal best suited to his needs. For multiple tap work the Type "D" fulfills every requirement. It is compact, yet affords ample work room, and is made of hard maple boiled in oil and shellaced. The terminals are of the lock nut type thus guaranteeing a perfect connection. The cover is of heavy galvanized iron and locks securely in place. This terminal is made in all sizes and the company will be pleased to quote prices and furnish circulars upon request.

W. N. MATTHEWS & BROTHER, of 226 North Second street, St. Louis, state that they have been working their

its last blotter has an old poem entitled "When the fever's

factory day and night in order to keep up with the demand for Stombaugh type "B" guy anchors. Many of those who could not use the old style anchor, because of the welds in the rods and eyes, and because of the weakness and inconvenience of the old wrench, have been converted by the type "B" Stombaugh guy anchor and wrench, which have none of these faults. Mr. W. N. Matthews states that they have succeeded in regaining the favor of one of the largest telephone companies in the United States by means of their new and improved anchor. These people had turned down the old style five and six inch, because of defective welds, eyes and wrenches. They have placed orders with the Matthews brothers since the first of April for over 7,000 five and six inch anchors. A handsome new catalog describing the type "B" anchor will be mailed to anyone on request.

COMMERCIAL ELECTRICAL SUPPLY COMPANY, St. Louis, is sending out the following: "With the weather in your favor and the winter gone before; with the coal strike settled for a while at least, we come back with gentle spring and the lay we have to sing, is, will you do that line work now or not at all. We have sharpened up our pencil, you will find the price is right, with the stock to make the shipments large or small. So it's really up to you, and your orders not a few we're expecting to receive in days to come. The poet that wrote the foregoing "jingle" was called in on the "carpet" and received his "ultimatum," and we are only "putting this over" in sympathy with him, and hasten to say that he conveys our meaning but not our words. Our salesman, Mr. "Net Price," will call upon you within the next few days, and we trust you will look up your stock, have him assist you in figuring your cost on line extension and repairs contemplated; also don't overlook the prices on tools when you send us your order.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY, Buffalo, N. Y., is manufacturing a large common battery multiple lamp signal central office equipment for the Hornellsville Telephone Company of Hornellsville, N. Y., and a similar equipment is also being manufactured for the Cortland County Telephone Company of Cortland, N. Y. The company is just completing installation of common battery equipment of the lamp signal type for the Citizens' Telephone Company of Bath, N. Y., and also for the Lancaster Telephone Company of Lancaster, N. Y. Both of these equipments include a Century four-party selective system. Other selective systems were recently shipped to Williamsville Telephone Company, Williamsville, N. Y.; Bolivar Telephone Company, Bolivar, N. Y.; Killawog Telephone Company, Marathon, N. Y.; Citizens' Telephone Company, Allegheny, N. Y., and the Livingstone County Telephone Company, Livonia, N. Y. Common battery extensions were made to Ithaca, N. Y.; Springville, N. Y.; East Aurora, N. Y., and Attica, N. Y. Recent magneto switchboard shipments were made to Belmont, N. Y.; Geneseo, N. Y.; Farmersville, N. Y.; Little Valley, N. Y.; Caywood, N. Y.; Lodi, N. Y.; Interlaken, N. Y.; Ithaca, N. Y.; Attica, N. Y.; Russell, Pa.; Freeville, N. Y.; Akron, N. Y.; Springville, N. Y.; Coudersport, Pa.; Charlotte, N. Y.; Williamsville, N. Y.; Stafford, N. Y.; Truxton, N. Y., and Sugar Grove, Pa.

THE GOULD STORAGE BATTERY COMPANY, New York, has recently organized a special telephone battery department to look after its rapidly-increasing business in storage batteries for telephone service. A corps of experienced engineers has been engaged to devote their entire time to this application of the battery. The Gould company is not a newcomer into the telephone field. It was over three years ago that one of the most important telephone companies in this country placed its first order for Gould storage batteries as a trial installation, which was subsequently followed by similar equipment orders for six additional exchanges. The Gould plate has a large contact surface for active material which is developed out of the lead of the blank itself by patented process of "spinning" the surface of the blank into numerous thin ribs. Only chemically pure rolled lead is employed, the great density and uniformity of which are prominent factors in securing the high economy and long life of Gould batteries. The success of the storage battery in replacing gravity and other forms of primary cells in the modern telephone exchange has been due to three factors: First, the less space occupied; second, less care and attendance required, and third, considerable saving in the cost of maintenance.

THE STERLING COMMON BATTERY equipment is steadily winning the approval of telephone exchange owners in all parts of the United States. The advantages of this particularly well-known circuit has long been recognized by practical telephone engineers, but owing to the fact that a suit had been brought against the Sterling company by the Western Electric Company, many orders had been held in abeyance, awaiting the final outcome. Now, however, that the patent situation has been cleared up, orders have been pouring in to such an extent that it has become necessary to put on a night shift in the switchboard room in order to keep up with the company's numerous orders. In addition to the 5,000-line board at Galesburg and the 1,400-line extension to the Toledo board, now nearing completion, there are also installations progressing at Uhrichsville, Marion and Lima, Ohio; Bloomington, Indiana; Belvidere, Illinois; Cedar Rapids, Iowa; Joplin, Missouri; Witchita, Kansas; Hattiesburg, Mississippi; Whittier, California, and Callao, Peru. In magneto call boards, Benton, Kentucky; Plymouth, Indiana; Millerton, New York, and Germantown, New York, have been shipped within the last month; the last two being equipped with the new self-restoring drop recently brought out by the Sterling company. This last drop, by the way, has received much favorable comment wherever it has been shown, its simplicity and mechanical perfection being especially attractive, and the Sterling Electric Company has every reason to expect many orders from small exchanges in the near future.

THE WESTERN TELEPHONE MANUFACTURING COMPANY, Chicago, has recently brought out a new switch hook, the appearance of which indicates that considerable time and effort were used in producing what it claims to be the most simple and efficient telephone switch hook on the market. Useless, cumbersome parts have been avoided and strict adherence to correct mechanical and electrical principles has made this switch hook positive in action and reliable. Every part is made of material selected with especial care and reference to the purpose for which it is intended. The hook lever is made of stamped steel heavily nickel plated, operating on a pinion screw of case hardened steel, insuring strong support for the receiver and minimum of wear to those parts subject to wear. All switch springs are of the best grade of spring German silver and provided with pure platinum contacts. The base or frame is of brass and all the insulations are of hard rubber. Machine screws hold the springs in a perfectly rigid position on the switch hook base, and no electrical connection are made with the hook or base. The operation of the switch hook is not dependent on the switch spring; a master spring of steel piano wire giving the hook a firm and precise upward motion and the weight of the receiver bringing the hook back to normal position. The distance traveled by the main switch spring at contact points is one-fourth of an inch, insuring a clean break and a positive make.

All the apparatus manufactured by this company re-

quiring a switch hook is equipped with this new type "B" hook. The company will gladly send a sample of this hook for examination to any parties interested. Illustration of this hook can be seen in the advertising pages of this issue.

TELEPHONE CONSOLES THE POPE.

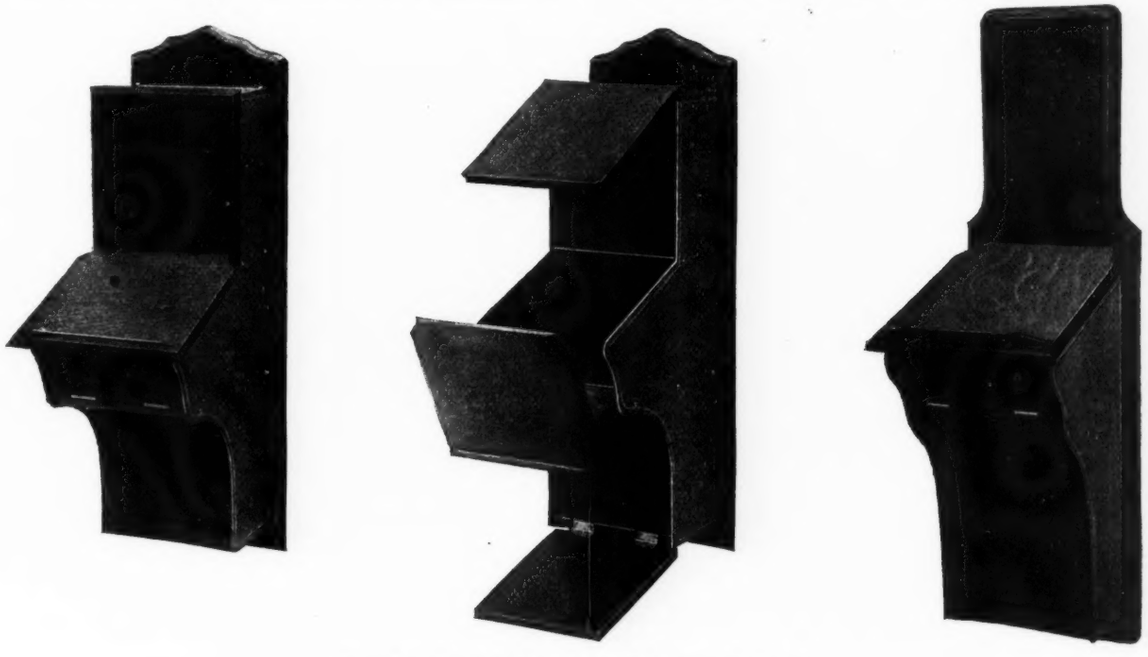
Shut up within the massive walls of the Vatican, Pope Pius X finds the telephone a great blessing. His Holiness recently received the director of the Venetian telephone system and was delighted to hear that with the new connection between Venice and Rome it would be possible for him to speak to his relatives at Riese, his native village. "If I cannot see them, it will be a great consoliation to at least hear their voices," exclaimed the pontiff.

The telephone is installed in many parts of the Vatican. Twice a day he rings up his three sisters, who live just outside the Vatican walls; and he keeps in daily communication with his secretary of state, Cardinal Merry del Val, during the latter's holiday.

A NEW TYPE OF TELEPHONE CABINET.

The Churchill Cabinet Company, Chicago, claims for the new combination, metal telephone cabinet, of which cuts are shown herewith, that it embodies the following ideas and improvements over the older types of wood cabinets:

By the use of the metal sides, an improved appearance is obtained. Metal in combination, or in its entirety, also is more lasting and does not allow warping and shrinkage as is the case in wooden cabinets. By the aid of the metal sides a smaller size cabinet can be used, the ordinary five-bar generator taking no more wall space than the three-bar did formerly. Note especially the benefit derived by the cabinet being "knock down."



Churchill Combination Metal Telephone Cabinet.

While the box is known as a combination metal cabinet, all of the electrical circuits are mounted on the wood parts, thereby obviating any chance of short circuits or grounding.

As will be observed from the cuts, the distribution of the apparatus is such that it is easily accessible and contains all of the valuable features secured in the now popular type of compact cabinet. These cabinets are made in two distinct types, as shown by the illustrations, being adapted to either compact, common battery, magneto or central energy purposes.

By the use of the metal sides some very handsome finishes are possible but the cabinet is furnished, usually, in plain black enamel, well burnt and with a lasting finish. A number of specially built and finely finished cabinets have been built for various manufacturers who intend making elaborate exhibits at the National convention at Chicago in June. Mr. O. W. Gullicksen, president of the Churchill Cabinet Company, will attend this convention and endeavor to meet all of his customers and friends among the telephone trade.

That the enterprise and skill of the company is appreciated may be judged from the fact that it recently has enlarged its plant to include the entire quarter square at 64-72 Churchill street, Chicago. This will increase its capacity threefold, and another large new engine, as well as a new dry kiln, have been installed to accommodate increasing business.

THE COOK SELF-WELDING WIRE JOINT.

Wire joints (or sleeves or connectors, as they are called) and their uses are so familiar to telephone men and to the trade in general that a lengthy description will not be necessary in introducing the Cook self-welding wire joint. The Cook joint, however, in its construction and application, differs radically from all other joints.

In the old style tubular joint, the tube is made to fit the wire as closely as possible. When the joint is twisted, the tube is not stretched around the wire, Mr. Cook claims, but is drawn close to some portions of it and bulges out at other portions, thus leaving a considerable part of the surface of the wire and the joint accessible to moisture and other atmospheric conditions.

The Cook joint is made with one side flat. The tube fits the wires closely, and when the joint is twisted, the flat side is forcibly and naturally drawn into the recess between the wires, stretching the joint absolutely tight around both wires. This makes practically a perfect cold weld joint, and it is impossible for moisture or air to penetrate the tube and corrode the wires or the inner surface of the joint. When the wires are inserted in the joint, twisted three times, and the joint is then cut in two, it is almost impossible to discern the line where the inside of the joint and the outside of the wire come together. The tensile strength of the joint is

much greater than that of the wire itself. Owing to the fact that the joint binds so tightly on the wire, it is unnecessary to turn back the end of the wire after it has been inserted through the tube.

No long detailed instructions are necessary for the use of the Cook joint. Simply insert the wires and twist three complete turns to the right. Cook's self-welding wire joints are made of copper for copper wires, and of steel, heavily tinned inside and out for galvanized iron or steel wire, and are manufactured by Frank B. Cook, 242 West Lake St., Chicago, Ill.

CALLING ON RURAL LINES.

BY M. I. CARPENTER.

The last issue and several others before gave a scheme for calling on rural lines. The last one was in two colors, and required a card to be hung up where the operators could see it. Our scheme is as follows: The calls on all rural lines have the same calls, that is, the fourth subscriber on all lines have the same ring, and are called as per the chart below.

In calling for a party on this line, say Rural 5, or Rural 2 L 1, as the case may be, having the calls arranged in this way the operator does not need any other information, not even the subscriber wanted, as 2 L 1 means two short, one long, one short, L standing for a long ring in every instance. For twenty subscribers the rings are as follows, and printed in directory as other names, only classified as Rural Line, Star Line, Lake Line, etc.:

2 ..... 1 L	3 L	L 2 L .....
3 ..... L 2	L 1 L	4 L .....
4 .....2 L 1	1 L 1	1 L 2 .....
5 ..... L 3	L 4	L L 1 .....
L 1 ..... 2 L	2 L 2	1 L L .....

A SUCCCESSFUL MEETING.

The annual convention of the managers of the Citizens Telephone Company was held at Grand Rapids, Michigan, on May 10 and 11.

In addition to about thirty of the Citizens Telephone Company's managers, there were a few representatives of outside companies present, namely: Clark Smith, of the Grand Ledge Telephone Company; William Robinson, general manager of the Citizens Telephone Company of Muskegon; H. H. Hutchins, of the Saugatuck & Ganges Telephone Company; F. M. Howard, of the Saginaw Valley Telephone Company; H. T. Clough, manager of the Union Telephone Company's Owosso exchange; W. J. Melchers, general manager of the Union Telephone Company.

The meeting was a complete success in every way, and meetings of this kind would undoubtedly be very profitable to any of the Independent telephone companies having enough managers to warrant such a convention.

On the night of May 10 a banquet and smoker was given to these visiting managers and to all of the male employes of the Citizens Telephone Company's Grand Rapids exchange. The banquet and smoker was held in the company's building and was attended by one hundred and sixty; the fun started at 7 p. m. and continued until about 11:30. The entire program was furnished by Citizens Telephone Company's employes and included speech-making, stories, vocal and instrumental music, etc.

SIXTH DISTRICT, INDIANA, MEETING.

The Sixth District of the Indiana Independent Telephone Association, which embraces the counties of Clay, Green, Owen, Parke, Putnam and Sullivan, held its second regular meeting in the general office of the Citizens' Telephone Company at Brazil on May 2, Vice-President J. F. Slinkard presiding. The attendance was good and there were several very interesting talks, especially by new members, which gave evidence of the value and appreciation of the association. Mr. Slinkard of the New Home Telephone Company of Linton spoke of the benefits of the association. J. G. H. Klinger, general manager of the Citizens' Telephone Company of Brazil, was elected delegate to the national convention in Chicago. The following delegates, representing all counties in the Sixth District and 7,500 Independent telephones, were elected to attend the annual convention of the state association, held at Indianapolis on May 17-18: Earl Talbot of Linton, E. G. Bush of Clay City, Joseph Moss of Linton, O. V. Gerrard of Spencer, F. M. Boyd of Rosedale, F. G. Gilmore of Greencastle, T. W. Atchinson of Terre Haute and W. W. Harball of Sullivan. The next regular meeting of the district will be held at Linton the second Wednesday in August.

SEVENTH DISTRICT INDIANA MEETING.

Pursuant to the call of the vice-president, the Seventh District held its second meeting at Indianapolis, May 7. The committee on by-laws appointed at the former meeting presented its report in the form of a set of by-laws similar to those adopted by a majority of the other districts of the state, which, with a few changes was accepted and the by-laws adopted.

S. P. Harris was elected a member of the auxiliary committee to represent Shelby county in the place of D. B. Wilson, of Shelbyville, the latter being no longer eligible on account of the company he represents being no longer a member of the association. The election of officers resulted in the re-election of W. M. Mendenhall, of Westfield, as district president, consequently state vice-president, and the election of C. M. Demaree, of Indianapolis, as district secretary-treasurer, said officers to serve for one year.

Twenty-five delegates were elected to represent the district at the state meeting at Indianapolis May 17 and 18, and the district officers were authorized to appoint any further delegates to which the district might be entitled.

AUTOMOBILES IN TELEPHONE WORK.

Automobiles and telephony do not appear closely related, but it is the fact that telephone companies, like electric light and power companies, use the machines to advantage. Mr. Leland Hume, general manager of the Cumberland Telephone & Telegraph Company, Nashville, Tenn., states that the corporation now owns and operates fourteen machines of the runabout type that are used daily by the "trouble men" and installers. Six of these machines are used in and around Nashville, where the country for a radius of 100 miles is traversed by macadamized turnpikes, along which the company owns and operates long-distance and local telephone lines. When a line is found out of order and the trouble is twenty miles from Nashville, it can be reached in an hour and a half. Under the old mode of conveyance by horse and wagon two-thirds of the day was required to reach the trouble. As a result the use of the automobile has been of great advantage to telephone subscribers and users, because it minimizes the time that any line remains out of order. Mr. Hume himself uses an automobile almost entirely in inspecting the long-distance lines in Kentucky and Tennessee, and in visiting the 150 different exchanges in that territory. It is said that each machine costs twice as much as a horse and buggy, but does easily three times the work.

The Fox River Valley Telephone and Telegraph Company, with exchanges at Green Bay and Du Pere, Wisconsin, has been adding subscribers at a rapid rate. A record being made in April when 125 contracts were received by the company in ten days.

CONVENTION PAPERS

INDEPENDENT DEVELOPMENT.

THIS talk on "National Development and Progress of the National-Interstate Telephone Association" must of necessity be somewhat disconnected and of a statistical nature. I have had prepared a general outline map of the United States, showing the principal trunk lines of the Independent system. We have made no attempt at showing the many hundred thousands of miles of wire that are being used to-day, for handling messages between local points and as feeders to these principal trunk lines. The three blue prints are the National-Interstate Telephone Association's maps of Ohio, Indiana and Michigan. The map of Ohio shows approximately 90 per cent, the map of Indiana approximately 75 per cent, and the map of Michigan approximately 85 per cent of the development. It is almost impossible to get the necessary data from some of the companies to complete these maps on a satisfactory basis. The National Interstate Telephone Association's mapmaker is instructed not to put any lines on the map that are not properly certified to and vouched for by bona fide Independent people.

We have divided the lines into two classes; class "A" being copper metallic lines of No. 10-8 and 6 wire; class "B" being iron and No. 12 and 14 copper. There are approximately 3,200,000 Independent telephones working to-day. There has been expended on the development of the Independent movement approximatly $300,000,000 in cash.

I wish to call your attntion specially to the outline map. Letter "A" in the state indicates that the state has an association; letter "S" indicates that they are using the official red, white and blue shield for advertising purposes, which was adopted two years ago by the Ohio Association and one year ago by the National Interstate Telephone Association.

The standard form of advertising is being used by the Independent companies in thirty-seven states. Ohio has used over 2,000 signs. A number of new state associations have been formed during the past year, among them being New Hampshire, Vermont, Oregon, Arkansas, Oklahoma and Indian Territory. It is interesting to note how rapidly the few remaining cities of consequence are being picked up by the various Independent interests, so as to complete the system. A franchise has recently been taken up in Detroit by our friends. Messrs. Brailey and Woodbury, and their associates from Toledo and St. Louis; New York city franchise by the United States Independent Telephone Company, franchise at Spokane, Wash., and Portland, Ore., and a large number of towns and cities of less importance in those states by Mr. Charles E. Sumner. Franchises are pending in Milwaukee, Wis., in San Francisco, Cal., Cincinnati, Ohio, Evanville, Ind., Nashville, Tenn., and a number of cities in New England. It will be of interest to note that there is quite a development in New England at the present time. The people of that section of the country have been led by our opponents, who have been especially strong around Boston, to believe that there was no such thing as an Independent system.

The flood tide of the Independent development has so thoroughly covered the central west and Pacific slope that it is impossible to hold it back longer from the eastern coast.

The development in Cleveland during the past two years has shown an average of 500 telephones per month; contracts received so far this month by the Cleveland company show a continued growth at the rate of 1,000 per month. The Columbus Citizens' Telephone Company is growing at the rate of 500 per month. The Frontier Telephone Company at Buffalo is gaining at the rate of from 500 to 750 per month. Philadelphia is showing a development of over 1,000 per month. The state of Texas is having an unusual growth. The Missouri Independent companies have had somewhat similar experience to what the Michigan Independents had some six years ago. Our competitors purchased six exchange properties during the past year and in three cases the cities have granted new franchises, and plants are now being built; the other cities and villages are ready to grant franchises.

The development on the Pacific coast is very marked. In many of the cities and towns it is equivalent to one telephone to every five people. Large office buildings have been built by a number of the Independent companies. Two notable cases are those at St. Louis and Wheeling. Also note that there is now a heavy copper line from Albany, N. Y., Baltimore, Md., and Philadelphia, Pa., to points west and south of Kansas City, with branches leading to Michigan, Minnesota, Kentucky and southern Missouri. The possibilities of the transcontinental lines will be apparent to everyone. We are so accustomed to seeing big things accomplished that we are likely to forget conditions as they existed ten years or more ago. At that time, had you addressed an intelligent audience like this, and told them that the Independent companies would have 3,000,000 telephones in operation on March 29th, 1906, you would have been regarded as a fit subject for an insane asylum.

The success of this development has been due to the fact that over 6,0000 operating companies have each been developing their respective territories, and in fully seventy-five per cent the devlopment has been intelligent, with a view to making a comprehensive system.

I cannot help but feel that the National Interstate Telephone Association, with its state and district organizations affiliated, is responsible to a very great extent for the systematic way in which the work is being carried on at the present time. Telephone development in the rural districts (and 85 per cent of this development belongs to the Independent system) has brought the citizens of the farm, the village, the town and the city all in close touch with each other, their subscribers are better equipped to do business with each other than ever before in the history of this country. There is not the waste of time driving back and forth; neither is there the waste, as under the old system, from overloaded markets. This results in the farmer getting better prices for his products, the merchant in the city being able to handle fresh and wholesome food at fair profits. It enables those living in the country to keep in close touch with the markets. A notable case in New Jersey: Between two towns, a distance of five miles apart, there are twenty-seven farm houses, of which twenty-six are equipped with telephones. It has advanced the value of farm lnad and enabled the farmer to keep as near up to date as his city neighbor.

The public in general are seeking information of the Independent telephone movement. The Atlantic Monthly for the month of February published an article written by Mr. Jesse Weik of Indiana. This article was reviewed at some length by the Review of Reviews in March issue, and a very substantial editorial on the same subject appeared in Everybody's, April number; Success commenced the publication of a series of articles in the February number, which has been continued in the March and April numbers, and will continue during May and June, all of which are being read with interest.

Efforts have been made to complete the long-distance lines on the Pacific coast—that is, in connecting all possible points west of the Rocky mountains. The development around St. Paul, Minneapolis, Duluth and other points northwest is very marked. Over 75,000 telephones are now connected with that system. There will undoubtedly be a trunk line built across the mountains, connecting the Pacific slope with the central west, within the next few years. The development in the state of Utah is extensive, extending as it does through the agricultural and mining districts of that state.

I have not touched on the development of the south, east of the Mississippi river, for the reason I understand that Mr. Barber, president of the largest company in the south, whom everyone welcomes as a member of our association, is to be here to talk on this subject himself.

The devolpment of lines between small cities will show equally as great in a majority of the other states as they will in Ohio, Indiana and Michigan. The National-Interstate Association hopes to have maps prepared of a larger number of states by the time the national convention is held in Chicago, in June next. Our success in this matter, however, will depend largely upon the co-operation we receive from the operating companies in the several states.

We find the companies all over the country, with few exceptions, standing loyally by their associates. We have hundreds of applications for information on numerous subjects of importance to each community. We are trying to get the few remaining places built by getting the different companies to extend their service, so as to fill in the gaps not yet taken care of. The outlook is most encouraging. More new money is going into the Independent movement this year than there has been in any two years in the history of the business. The securities are very much better regarded to-day than at any time in the past. There is no question about the business becoming better organized each year. We have made marked progress during the past year, and everyone who has studied "The Ohio Plan" is well pleased with it.—*A Paper read by Hon. James B. Hoge before the Ohio Independent Telephone Association, at Columbus, on March 29, 1906.*

DISTRICT ORGANIZATION.

I am tempted to read a paper prepared by O. H. Seifert of Eddyville, and presented at a meeting of the Southeastern association last fall. The paper was entitled "The Ideal Association" and Brother Seifert has the right system.

I am a believer in the Ohio plan of organization, which provides for a number of districts, ten, twelve, fifteen or perhaps even more in Iowa. The territory of a district should include companies who have much in common, whose business interests are largely mutual. The district associations should be officered by active telephone men, thoroughly alive to all the advantages of their positions. District meetings should be held at least quarterly. The small territory of

the district would mean but small expense for railroad fare or time to those attending and the close mutual interests ought to bring out every telephone man, the large exchange manager and the small mutual man. At the meeting, quoting from Brother Seifert, "when you see a man with a telephone face don't wait for an introduction, but step up and tell him your troubles. If you have time, listen to his; if he hasn't any, he's bogus, he's not in the telephone business."

The best results can be accomplished when every telephone company, big and little, belongs to a district association, and the Independents will not be satisfied until the best results are in sight. At the district meetings the greatest good will come, not from discussion of the paper with the most high sounding title, but the exchange of ideas about our daily troubles, our methods of doing this or that piece of work, and, above all, from the acquaintances and friendships formed, which will do more than anything else to avoid the friction too often existing between neighboring companies.

Here the chances for trouble of the latter kind will be aired and remedies found and applied. Here the minor questions of territorial rights will be settled. It is impossible to overestimate the good that can and will be done by these district associations.

The plan further contemplates state associations, delegate bodies, made up of representatives elected by the district associations. All will be welcomed at the state meetings and will have opportunity to hear the program and take part in the discussions, but the work will be done by the delegates. I believe the state association should have a salaried man in the field, an organizer, a man whose business it should be to line up the companies not members of any association, point out to them the straight and narrow path in which all the faithful should walk. A man who would be sent to see the weak-kneed brother who is considering a sub-license contract, bolster him up and if his weakness is due to real or fancied troubles with other Independent companies, see that he gets justice. He should be a practical telephone man if possible and able to assist and advise new companies and older ones, too, for many of them are oftimes in need of the assistance of a man whose judgment can be relied upon.

The state association should have maps and data from all Independent companies. Such information is often wanted. We were called upon recently for such data by the Nebraska Association at the time of a meeting with the commercial club of Omaha; the purpose, of course, being to secure their aid in getting a franchise in Omaha. Such data are often useful in effecting a raise in rates. Such data would interest prospective purchasers of securities.

The Clearing House Company is a protege of the association, and every toll line man here who has not already done so should immediately investigate this proposition; do not delay, do not wait until every neighbor has gone into it, but look it up thoroughly and do it now.

Legislation and litigation should be watched by the state association. Endless trouble and much expense has been saved the telephone interests of this state in the past, by an active committee. Bills are often presented in good faith which would be of benefit to a particular locality, but which would work much hardship to the craft in general.

The larger questions of territorial rights, long-distance toll lines, mutual insurance perhaps, and others would also receive attention at the state meetings.

The state association will send delegates to the National-Interstate Telephone Association. This body will also have on file maps of all Independent lines; it will gather data from all the states showing respective strengths of the Bell and Independent companies as to exchanges, subscribers, rural subscribers, iron and copper toll lines, etc.

It will conduct a press bureau, a department of publicity, that the world at large may know that we are doing things, that people may know that another spring has been discovered and that the fount of all wisdom at 125 Milk street, Boston, has a rival.

The National-Interstate's committee on legislation and litigation will have similar duties to that of the state association and in addition will keep in touch with patent litigation. Few realize the patent litigation work carried on by the old National association.

The National association will have standing committees in addition to the one just mentioned on "Standard Forms of Accounting," "Standard Operating Rules," "Standardization of Equipment," "Best Methods of Advertising," and perhaps others.

Much good can be accomplished by following the report of the committee on standard forms of accounting. Comparisons of costs between different companies are almost worthless unless the accounts are similarly kept. Of course, the large company will keep a finer distribution than the small one, but this merely means that the accounts kept by the small company will be subdivided.

Comparisons of costs of operation, as to salary accounts, materials and supplies and similarly costs of maintenance will assist all of us in keeping our expenses down.

Standard operating rules are of importance, too, more so in handling of interchanged toll business than in local work.

Similarly standardization of equipment is of great value in connecting up toll circuits for interchanged toll and long-distance business.

All of these organizations will work hand in glove for the furtherance of a common cause. Each will do its share in encouraging Independent enterprises, the building of exchanges where we now have no connections, the construction of toll lines for more direct or longer distance service, the strengthening of the weak lines.

To get results the telephone men must not only be members of associations but must realize the results to be gained by co-operation; they must be workers in season and out, especially outside of convention gatherings.

This kind of work will cost some money, but the end will justify the means. We cannot get something for nothing. If we can, by the expenditure of a little money, bring about a great, strong machine in which each will have a place and yet friction be reduced to a minimum, we will have the best possible insurance as to the stability of our properties, the best guarantee that no broken cog will stop the entire machine.

Let us place the National emblem on our banner and adopt for our slogan, "Look for the shield."—*A Paper read by Charles C. Deering before the Iowa Telephone Convention.*

THE STANDARDIZATION OF CONSTRUCTION.

Although strong arguments against the standardization of apparatus have been advanced, principally on the ground that it would tend to discourage the development of improvements, there are no such reasons existing why line construction should not be standardized as far as possible. None of the arguments advanced against the standardization of apparatus would apply in this case, and it is probable that the managers, construction men, manufacturers and supply dealers alike would welcome the change if it could be brought about.

You have no doubt noticed in your travels the many different methods and styles of construction work on exchanges and toll lines throughout the country.

One exchange will have heavy, strong poles, well set, but equipped with light cross arms, while the next is as likely as not to have slender, light poles, few and far between, and equipped with heavy standard cross arms. The one will be guyed to anything on which a guy wire can be attached; the other will possibly be strongly guyed and anchored. One will have galvanized hardware, while the iron work attached to the other will be plain or a mixture of both will be found. The line wire used in different exchanges is of all kinds of gauges. The same conditions apply to toll lines.

This condition has in few cases been brought about by a desire on the part of the investor to practice false economy. In other instances lack of experience and the abnormal growth of the business are largely responsible, as pole lines that were originally intended to accommodate a few wires are now called upon to support aerial cables and many cross arms full of wires.

The description I have here given must not be construed as applying to all Independent construction, as there are many extremely well constructed and equipped exchanges and toll lines. Nevertheless there are many exchanges throughout the country which will in the next few years be compelled to reconstruct their outside plants either wholly or in part. There are no progressive companies that are not continually making some extensions. The toll lines, which are the medium that will eventually cement all these groups of exchanges together, have many miles yet to be constructed, and I believe that now is an opportune time to agitate the question of the standardization of construction.

If you are interested you will no doubt ask what remedy I have to propose and how I propose to apply it: the remedy, like a physician's, will not cure all cases, and in some cases the patient may refuse to take the medicine. In order to get proper action the matter would have to be taken up by the National association and would require the co-operation of state associations. The only pressure that could be used to bring about this improvement would be educational. Let the National association appoint a committee to draft copies of construction specifications, covering exchange and toll-line construction. Let them adopt materials that are best suited for the different uses to which they are to be applied, according to their strength and dimensions. We will take the item of cross-arm braces for an example: The braces should be, we will say, 1¼x¼x26 inches and shall weigh when galvanized 286½ pounds per 100 pieces. Your galvanizing specifications would familiarize your construction man with simple methods of testing galvanized iron or steel wire and hardware. Construction specifications should be illustrated with examples of the proper methods of pole setting, guying, wire stringing, transposing, etc.

Specifications covering cable work should recommend size of conductors, insulation, resistance, static capacity, thickness of sheath and per cent of tin in sheath for aerial cables. When your specifications and standards have been adopted let the secretary of each state association be supplied with copies for distribution among the operating companies in his state.

This need not prevent the adoption of improved methods; as fast as improvements are made let the standard be raised and the fact made known, so that all may benefit by it. Your competitor does not stop progress by adopting standard materials and specifications; as soon as a good thing is introduced by one of the operating

or lessee companies, after examination and approval it is adopted as a standard all over the country. The reason that the small exchange owned and operated by the small company does not usually show up as well by comparison with your competitor's small exchange is that your small company has not had the advantage of your competitor's experience. Independent exchanges in the larger towns and cities, as a rule, are as well or better constructed than Bell exchanges, as they can procure the services of competent engineers to look after their interests.

Standardizing materials and methods does not mean that what is now in service should be taken down and discarded or that there should be any loss incurred by the operating company. It would only be necessary for companies to change their construction to the new style when it has outgrown its usefulness or is worn out, and when erecting additions and extensions.—*Abstract of a Paper read by Frank B. Hall before the West Virginia Independent Telephone Convention at Parkersburg.*

A RURAL CO-OPERATIVE TELEPHONE EXCHANGE.

The Saugatuck and Ganges Telephone Company, Ltd. (located in western Allegan county, Michigan, with headquarters at Fennville), was started by a few fruit growers combining with local steamboat men in 1895 for the erection of lines reaching into the fruit sections from shipping points. About two dozen telephones were first installed, each member paying for the entire cost of his connection. It soon became necessary that we associate ourselves and elect officers for the management of the little system, which was done in 1896. A provision in the by-laws was that each subscriber pay for all material required for the maintenance of the telephone and that each stand his pro rata share of the cost of maintenance and operation.

It has since been arranged that where several desire to connect to our centrals by party line the company will run the wire to the vicinity and allow the subscriber to connect thereto free of line charge. All supplies and instruments are furnished at actual cost and the work is done by experts in the employ of the management at as low a rate as possible, looking forward to the benefits to be derived from the ability to reach as many as possible of the members of the community. The system is purely co-operative and no dividends accrue, only sufficient charges being made to cover cost of maintenance and operation.

Officers are elected from among the shareholders annually, which places control in the hands of people who have no object other than efficient service at as reasonable a figure as possible.

The growth and efficiency of the enterprise is too well known here to call for comment, and to extend thanks to any one would be merely self congratulation, since it is outgrowth of an enterprising community who operate it according to their own liking through managers elected annually from among their own number, and who are residents of the community.

When the little plant was first started no one knew anything about telephone matters and but very few in the community had ever talked over a wire. Accordingly the general impression was given out that there would be no cost after installation. Switchboards were placed in stores and offices at the five centers—Saugatuck, Douglas, Ganges, Fennville and Glenn. The attendants agreed to do the switching free of charge, it would be such sport, and the instruments were supposed to be as free from troubles as the piano in the parlor or the colt in the pasture.

The first lot of telephones were installed by the aid of a local telegraph operator, and an expert from the factory set the switchboards. Things ran smoothly during the fall of 1895 and the following winter, but in the spring of 1896 a dark cloud accompanied with a terrific wind and electric storm rolled up over old Lake Michigan and—well, any telephone man knows the rest. Our lines are mostly grounded.

By this time our attendants began to think best to answer telephone calls when they could not sell goods, so the subscribers grumbled because their calls were not properly attended to. At the same time the fellow who had been obliged to leave his business to "see if he could find the trouble with the telephone" began to sit up and take notice also.

Another matter developed at this time, that of having a head to the enterprise. There was no one who had authority over it and it was running wild. A meeting was therefore called of all who had donated to the construction fund and it was decided to organize. Three bright fellows were chosen to draft a set of by-laws. This being a mere matter of form and of not much consequence, took but twenty or thirty minutes; but we appreciated the fact by this time that there must be some expense attached, so a clause was inserted providing a pro rata charge for maintenance and operation, as mentioned above, and another that all matters should be referred to the shareholders for ratification, and we signed the articles of association and proceeded to elect officers for the ensuing year.

One of the first observations of the new board was that we would be under the necessity of paying our attendants a stipulated sum, and that we must employ an expert to look after trifling matters which seemed to creep in to disturb the perfect working of the instruments, so an assessment of $2.50 each was levied for a sufficient amount to settle all accounts to date. Things ran on in a hit and miss way until January of 1898. By this time our assessments had amounted to about $9 per year for the two and one-half years we had been running. This was considered exorbitant and there were rumblings of distrust to be heard from the members, and as the board of directors were serving gratuitously they decided to let the honors of office fall upon other members, so an entire new management was elected. Just previous to this meeting, however, the manager had a new code of by-laws carefully drawn up and signed by a majority of the stockholders, to become operative at once, so that the new board to be might not be hampered as the old one had been by having to refer every important transaction to the stockholders.

At this time there was a deficit of about $300 and it was decided to place the business on the basis of an annual rental of $12 payable quarterly. This sum was supposed to clear the indebtedness and allow the board sufficient funds with which to run the plant and clear up all accounts. It would doubtless have met all expectations had not the fact developed that many of the pole lines were already overloaded, and more wires waiting to be strung, so much work had to be done and expense for material had to be met, and at the end of the second year of the new management we were about $700 deeper in the hole than when they took the reins of government. They were all good business men in their own line and strictly honorable, so our little community settled down to the conclusion that it took money to run a small telephone plant as well as any other enterprise, and they voted it to be the sense of the meeting of shareholders that the board place the rental at $15 per year, which was done immediately by the new board and we have dropped out of the fence corner gossip.

At the $15 annual rental we have practically cleared our indebtedness—that is, we have sufficient amounts now due to finish doing so—and have added many improvements in the meantime. Our expense account has been swelled in the work of correcting errors in first construction, and in reconstruction made necessary by overgrowth. In other words, getting experience in a new business.

Our principal advantage in co-operative ownership and management lies in our peculiar situation. This being a fruit growing section it is important that our subscribers, who are mostly fruit growers, have free access to all the local marketing points, since much of their output is sold at the surrounding stations, and telephone connection with but one of the stations would be of little advantage, while a toll rate would become burdensome. As our company is mostly made up of fruit growers, we can, by this plan, allow ourselves the use of the entire system by paying a sufficient rental to maintain the plant, while an outside company would be obliged to charge toll between stations for interest on the investment.

In our five exchanges we have an average of 200 subscribers in winter and 250 in summer months, or an average of, say fifty to each exchange, when all are working. Our rates are $2 per month for three months, $1.75 for six months, $1.50 for nine months and $1.25 annual rental.

By the friendly toleration of the large companies which control the long distance lines passing our section we are enabled to reach outside points over their wires and at the same time maintain our local institution to our own liking.

Were it not for the peculiar conditions—our perishable crops and the consequent necessity for free access to our surrounding shipping points, both by rail and water—I could see no advantage in co-operative ownership and management.

Ours are mostly single grounded lines, and while less expensive than metallic circuits, we have the amount of crosstalk common to that sort of construction.—*A Paper by H. H. Hutchins, read before the Michigan Independent Telephone Association at Ann Arbor, March 22, 1906.*

PROGRESS OF THE TRAFFIC ASSOCIATION.

The Traffic Association has been in operation a few days over twenty months, starting with thirteen companies enrolled, the number having steadily increased until at the present time we have an enrollment of forty-one companies, consisting of thirty-six toll-line or long-distance companies and five local companies; out of the thirty-six toll-line companies two have sold out and two have merged with other Independent companies, leaving us thirty-two toll-line companies who are making their reports and clearing from month to month through the traffic association.

With two exceptions there are no Independent toll-line companies in our state that are not members of the traffic association, even the two exceptions mentioned send reports of their Michigan business each month to be cleared. Thus our field, so far as Michigan is concerned, is pretty well taken care of; still there is plenty of work to be done, as I shall endeavor to explain.

Those of you who were present at the convention at Battle Creek last year will possibly remember that I called attention particularly to the routing of reports and to the handling of errors. I am glad that there has been a general improvement along both of these lines, yet there is still a chance for further improvement,

as there are a few companies that overlook the importance of routing, and some who, wholly or in part, ignore their error reports.

I remember when I first began to talk about the importance of checking errors I was told that it was a mistake, that it wouldn't pay; nevertheless, from July 1, 1904, to December 31, 1905, we sent out error reports to the amount of $10,307.93, an average of $572.66 per month. During the same period of time our gross clearance, not including check error settlements, was $69,544.84. Thus our check errors amounted to 14.8 per cent of our gross clearance.

I think you will all agree with me in saying that this is several times larger than it should be and shows that our companies are not giving this important phase of the work proper attention.

Someone says: "Well, you have sent out errors to the amount of $10,000. How much have you received back?" We have received back $8,147.45, or 79 per cent; there remains $2,160.48, or 21 per cent, outstanding that will be sent to us later.

Out of those reports returned $3,604.79, or forty-four per cent. were acknowledged errors that have been pro rated or are under process of pro rating at the present time, and $4,542.48, or fifty-six per cent, were explained.

By the word explained I mean those items for which they refuse to settle for various reasons, by using such phrases as "No reply," which means that they have mailed one or more error cards to the office that has overchecked them and the overchecking office has not compared the card with their check ledger and returned same with detail; consequently there is nothing left for them to do but to explain same by saying "No reply" or "Second card no reply." Another explanation is "Called but didn't get party," or "No talk." Both have the same meaning. Such an explanation shows that either the sending or receiving operator did not watch the call properly.

"Did not check overtime" is an explanation we sometimes get. Incidentally the companies who have followed up their overtime calls closely do not hesitate to say that it pays. For instance, the Grand Rapids office alone has a monthly income from this source on originating business of about $150, and Mr. C. E. Tarte, general manager of the Grand Rapids company, informs me that this is the least important benefit to be derived from overtime checking. He states that whereas one thousand calls per month were considered a load on a five-minute basis, that under the three-minute schedule fourteen hundred to sixteen hundred calls are considered a load.

It seems to me that these facts warrant every company and every office of every company in getting in line and checking overtime, unless on account of poor service the sending operator makes request to the contrary.

Other explanations are the differences in rate, which should always be reported to the general manager and by the general manager direct to the traffic association for correction; "Should be collected at other end" or "Reversed" shows that operators have not been careful in recording and getting proper O. K.'s.

Perhaps some of the companies here represented are wondering if all the companies in our association are following up and reporting on their errors. I am glad to report that with a very few exceptions they are, and your traffic committee has even made arrangements that whereby these companies who are somewhat backward and modest about reporting may receive additional help. Let me describe the plan to you, using the words as found in the minutes of the meeting of the traffic committee held at Grand Rapids December 15, 1905:

"All companies who are members of the Michigan Independent Telephone Traffic Association shall be entitled to a period of forty-five days in which to make settlement of error reports, but, and if, any company shall completely and entirely ignore said error reports, or any part thereof, for a period of three months beyond the forty-five-day limit it shall be considered as an acknowledgment of said error reports and shall be charged to such companies in total."

I find ofttimes that these delays are caused by some of our companies not having a clear understanding of just how they should proceed to clean up the error reports, and so they either send same back to the association explained by saying "No record" or, what is worse, if that is possible, keep it and say nothing.

In order that we may understand each other better I wish to outline the way these error reports should be handled in order to save time and expense as well as get results.

The check error reports are sent from the clearing house monthly in duplicate direct to the general office of each company. The general office should immediately compare same with reports from sub-offices. If the error is not found in the general office the duplicate copy should then be forwarded to such sub-offices as are in error. The sub-office immediately should compare the report with their detail, and if the error is not located, an error card should be filled out showing the amount of overcheck and undercheck, also an itemized statement which shows the amounts checked on the several days during the month. This card should be mailed to the office that has overchecked. They in turn should compare with their records and check on the error card, opposite the proper date, the amounts that they overcheck, giving detail of all such messages, and return same at the earliest possible moment to the office they have overchecked, who then enters proper explanations or acknowledgments on the error report and returns same to their general office; the general office would copy same on the original report and return to the clearing house. The general office would be entitled to keep the report fifteen days—a week in going and a week in coming. The sub-office would have thirty days in which to mail error cards, get replies and report back to their general office.

A feature of our work this year has been the introducing of a complete set of toll forms to our companies for the purpose of getting them to handle their toll business uniformly.

A large majority of the companies have adopted these forms, and we have been able to furnish them anywhere from ten to seventy-five per cent cheaper than they could be purchased at the several local printers, and while the association has sold these at a small profit, such profit is applied on the operating expense of the association, thus reducing assessments proportionately.

In conclusion, I wish to give a brief review of our work for the past year. The traffic cleared from January 1, 1905, to December 31, 1905, amounted to $50,877.60, or an average for the past year of $4,239.80 per month. February was the lowest month, amounting to $3,510.93, and October was the best, with 18,283 messages, amounting to $4,587.71. For October, 1904, we cleared $3,604.55, showing an increase of interchanged business for similar months, a year apart, of $983.16.

The entire toll business of the state runs about $25,500 per month; the traffic association clearing about one-sixth, or 17,000 messages per month.

During the year it has cost our companies $300 per month to operate the association, this being a little over seven per cent or less than one and four-fifth cents per message, as compared with two and one-half cents per message our first year.—*A Paper by W. S. Vivian read before the Michigan Independent Telephone Association at Ann Arbor, March 22, 1906.*

HOW TO HANDLE THREE-COMPANY BUSINESS.

With the experience that I have had it seems to me the question "how to settle joint business" is the most difficult proposition of anything pertaining to the business.

Telephone joint business is not exactly paralleled by any other business. The postal service is the closest, as joint business is done with the foreign countries.

Railroad companies do a joint business with each other and have adopted methods so they are at present working under a system which is more simple than we can adopt, for when a company has carried an assignment of freight to the point where it is to be transferred to another road, charges are collected, the receiving company put on its advance charges and so on until it reaches its destination. There they collect total charges.

When a telephone company has a message that travels to a foreign line there is no way of stopping the talk and collecting their advance toll. The message must be settled for, either at the station where it originates or terminates, yet it may travel over several companies' lines and it rests with the companies to adopt a system by which settlement can be made that will be fair and satisfactory to all.

The committee in assigning this subject to me undoubtedly wished my own ideas, which I will try to explain.

First, all connecting companies should adopt one tariff rate, one block route, one terminal fee and the paying of the same commission, then I believe it is possible for them to arrive at a satisfactory settlement. The question arises, "what would be satisfactory commission and terminal fee?" Most of the toll line companies are paying a commission of twenty per cent of all "out" business up to fifty cents and ten cents terminal fee on all "in" business, which seems to me that either one is not exorbitant, especially to the local exchange owner, who at the present owns farm lines extending out of his exchange from ten to twenty miles. On "out" business he is put to the expense of collecting most of the toll from farmers and local subscribers and is sure to suffer a certain percentage of loss, being compelled to do a credit business, therefore is entitled to a fair commission. On the "in" business, many times he carries a message out in the country more miles than the toll line company has carried it, therefore by including both country and town telephones it averages up so that a ten-cent connecting fee compares very favorably to toll rates charged, or with the United States mail in special delivery as they make a charge of ten cents to deliver a letter if it only goes next door to the postoffice.

Understand me, I do not say it is necessary for a toll line company to pay the above commission to their agents. Yet they should agree upon some kind of terms similar for joint settlement, especially commission paid, which I consider the most essential. For example, we will say a message originates at a local exchange, owned by local parties, and is carried by the toll line, connected with said exchange, a distance of eight miles. There it goes on to a foreign line, to reach its destination it travels eighty miles; the tariff is forty cents, the toll line company pays a commission of twenty per cent, which is eight cents, but in settling joint business they

do not deduct commission, but settle on line haul; they would only receive four cents. Therefore by having the message they would be out the use of their line and four cents. If commission was deducted first, the toll line company would receive three and one-fifth cents for the eight miles of line haul.

With the above commission adopted, a fixed block route and the same tariff rate, companies could then arrive at a joint settlement by first deducting the commission paid where message originates, then deduct terminal fee, then divide the remainder according to the number of miles of line the message is carried by each company, as per block route.

Some believe that a clearing house is the proper way for settlement. Where would you locate it? Supposing we locate it at Sioux Falls, as soon as you get one hundred miles east of here they have as many messages east as west and so on until we reach the Atlantic. The one great trouble is, there is no jumping-off place. The same applies to the telephone business in general.—*A Paper read by T. F. Robinson before the South Dakota Telephone Convention.*

TACTICS OF THE OPPOSITION.

This is not a subject of my own choosing nor is it one to which I had given much thought prior to receiving a request to prepare this paper; but its importance has dawned upon me with increasing force as I have endeavored to give it the consideration necessary to qualify me to appear before you.

It is not necessary to say that in common with all the Independent workers I not only have no quarrel with the men enlisted against us, but that on the contrary, I have the highest regard for all; and the best of friendship for many of those with whom I am acquainted. I delight to exchange courtesies with them. And as pickets of opposing armies exchange coffee for flour between battles; and as the general of one army delights to show his highest personal respect for the general he must fight, so we hold ourselves above petty personalities; but it is war and not competition that we are engaged in, and we can only regret that so many real good fellows are on the other side in this fight.

In considering this subject the first point which impresses me, is that our success depends entirely upon the correctness of our ideas concerning our opponent's tactics, and that, therefore, we have everything to gain from correct information and right conclusions deducted therefrom, and everything to lose from the acceptance of incomplete data or opinions that are out of harmony with the facts. My next thought is that from information within my reach correct conclusions are not easily arrived at; and what may seem to me to be a fact may be declared by you to be a fancy; but I believe you will agree with me concerning what I not only consider a fact, but the fact of greatest significance, viz.: Our oppenents are changing their tactics.

I was profoundly impressed when as a boy I heard for the first time of the laws of the Medes and Persians, which could not be altered even by the king who made them. And when I first became associated with the Independent telephone movement, I was likewise overawed by the apparent power and dignity of our opponents, whose rates and regulations were all dictated by the "wise men of the East" and like the laws of the Medes and Persians could not be changed. Even the oldest veterans in the Independent movement, to whom I naturally turned for much needed counsel, all advised me to behold the "big company" with its irrevocable rules; and my advisors argued that, like them, we too 'must have a rule and stick to it."

But the once unchangeable policy of our opponents has been completely abandoned; and no one who is acquainted with the facts can point to their present practice in Iowa as a proof of the sort of argument that was given me a few years ago.

Paul, that wise philosopher of Tarsus, once said that he made himself all things unto all men in the hope that by such means he might win a few of them, and our opponents are certainly manifesting their willingness to do anything for a short time, if by so doing they can catch an occasional unwary Independent exchange for their toll line connections.

They once argued that no transmitter could transmit and no receiver could receive sound waves unless the subscriber paid to the Boston company an annual rental or royalty amounting to at least one hundred per cent of their actual cost; and they refused, absolutely, to connect with any exchange or circuit that was equipped with any other style of receiver or transmitter. They argued that their equipment was so superior, and instruments of all other kinds so inferior that it left a tremendous gulf between; with no possibility of bridging the chasm. But now their wires are on the same poles and their instruments in the same exchanges and on the same circuits with what they once despised as an inferior class of equipment.

Our opponents once argued with the force that is born of desperation, that two telephone systems are a nuisance and a useless expense in any community. It is quite probable that the public always gave at least a partial assent to their argument, and has constantly grown toward a settled conviction that it is correct; but it has been demonstrated by experience that two or even three Independent telephones are obtainable at no greater cost than was originally paid to our opponents for one. For that reason our opponents' argument for a single system has not had sufficient weight with the public to prevent the organizing of something like fifteen hundred companies in our own state and some six thousand companies in the country at large, with more Independent telephones installed by the Independent movement than by their own.

Therefore, a second conclusion which I reached in the consideration of this subject, and one which I think you will accept as a fact, is that our growth has been a tremendous surprise to them and a thing they have been unable to account for; and it is our surprising growth and their inability to account for it that explains why they are changing their tactics at this time.

Surely they never expected the Independent telephones in service to outnumber their own. On the contrary it seems perfectly safe to conclude that they had every assurance that by means of their sublicense contracts, their lawsuits, their franchises in all the important centers; together with their twenty years of development before any competition arose, they would easily maintain such a preponderance of power that they could always collect their one hundred per cent more per year royalties on practically all transmitters and receivers, besides being able to regulate their toll taxes according to the ideas of a European monarch who defined taxation as "the science of so plucking the duck as to get the most feathers with the least squawk." But the American telephone user is not that kind of a duck.

If, then, it is true that they are changing their tactics, and that the change is due to developments which they failed originally to anticipate, I submit to you whether it is not the most important thing we can do, to proceed at once to find out if possible why they failed to discern things correctly.

They must have failed at the outset to look at the matter from the right standpoint. They must have seen their own interests in the wrong light; and I am sure if we can discover wherein their ideas were fundamentally wrong we will have taken a long step in the direction of an idea for ourselves that is right, thereby making more sure the progress of our own cause.

The difficulty in connection with the tactics of our opponents seems to me to be that they emanate from a spirit that is out of date.

We are living in a time when mankind seems to be rebelling as vigorously against the theory of royalties in our business as they once rebelled against the theory of divine rights of kings. It has been well said that since every creator is greater than any of his creatures the people must be allowed to exercise the superior or sovereign power over any corporation they have created. But as another has so aptly expressed it. "Many of the law-made or man-made corporations seem to have failed to remember their creator in the days of their youth.

The people are fully aroused to the fatality of the mistake they would make if they allowed any public service or any public servant to become their master; and so far as the Independent telephone movement has gone in its undreamed of and unprecedented growth it has won its way by taking the attitude of a servant.

Think of Iowa, with its hundred counties and only two or three individuals representing our opponents who have authority to determine how far the tactics of to-day may depart from the former fixed policy in any given case. Then think of the Independent men, who are not only in every one of the hundred counties or all of the sixteen hundred townships, but in nearly all of the fifteen thousand school districts as well, watching and working, in many cases with no other reward than a consciousness of bettering conditions in their home locality; the very best citizens in the best state of the best nation; and in the best age that history has known. Could anything under the sun prevent our success? Yes. What would it be? A relapse to the spirit and policy of our opponents whereby we should forget that we are servants and divert our efforts to building up a monopoly, or a mastery over our patrons.

But fortunately the present surprising tactics of our opponents leave no time for any of us to cultivate such foolish egotism. Every man who is blessed with enterprise enough to attend this convention should not stop until he has arranged for group meetings in his own home locality where he will call together the leading spirits of all his neighboring telephone organizations; and with them work out an agreement for a just division of territory; adopt rates and regulations as uniform as possible and provide for fair exchange of service; and, last, but most important of all, provide for service that shall be satisfactory especially to the rural patron, whose greater distance from the exchange makes his need for telephone service and telephone protection greater than the actual need of his brother in town.

A noted member of a so-called royal family is quoted as having said: "Humanity begins with barons. All below that rank are cattle." Some people who think they are in the telephone business also think that the real telephone patronage begins in cities of six, eight, ten or one hundred thousand inhabitants, and that all below that are cattle, or hayseeds. But when it is too late they awaken to the fact that they can only get away from the soil by moving over to the next world; and there does not seem to be very great

inducements for the high and haughty spirited telephone man to go there, either.

Everything that grows must have the soil for nourishment and the roots of the telephone system that is to live in agricultural Iowa must be fastened to the homes of the agriculturists.

Let us never make the mistake that our opponents made when they ignored the importance to them of the six or seven millions of farm homes; by which mistake they cut themselves loose from the earth and now find themselves up in the air, when lighting places are at a premium.

Yes, our opponents are changing their tactics. They are changing them because their former policy was based upon the erroneous theory that the Iowa farmers would continue sending the milk from their dairies to the "Milk street skimming station" in Boston just the same after the expiration of the original patents as had been done before. Or they may have been so busy at their Milk street station that they could not foresee that the milk maids of Iowa would have telephones even though they had to sell eggs to buy them. For similar reasons they may also have overlooked the consequences of losing their royalties from the farm telephones; which on the three million or more Independent subscribers now in existence would have amounted to six millions of dollars yearly, or a four per cent dividend on one hundred and fifty millions of dollars of capital; all of which the Independents escape through their freedom from paying tribute to the Milk street office.

It is not improbable either that in the rush of business the buttermaker on Milk street also overlooked at the same time how difficult it would be for his own sub-licensees to collect the two dollars per year royalty on the telephones in their own exchanges after they should be compelled to compete with exchanges that were not handicapped with any such burden; and it seems safe to conclude further that the Boston people are now forced to change their policy because they were unable to foresee from the start the further fact that ultimately three-fourths of the telephones will be in rural homes and in towns controlled absolutely by the rural population. Had they seen this and had they realized that nine-tenths of the toll messages would be between these small exchanges or originate or terminate in them they might have known that they would profit more from their service by taking from the start the attitude of a servant rather than the attitude of a master.

They have awakened to a realization of the fact that without the confidence and the consent of the people they cannot triumph in Iowa. They seem inclined to make one last desperate effort to place themselves once more in power. Whether they expect to do this by buying back their former position with temporary free or low rate rental and toll service; or whether they have actually given up their old purpose of mastering everything and everybody, remains to be seen; and whether they can make the people believe it, even though they actually change their spirit, remains also to be seen. More important still is the question: Is it possible for them now to operate permanently on the low rates they are conceding and at the same time sustain their present capitalization? Because, if they cannot do so, the raising of rates or reducing of dividends must inevitably turn their patrons or their investor against them.

No one would dare to deny that the sympathy of the eighty-five millions of people of the United States is all with the Independent telephone movement; but Josh Billings condensed a great deal of logic into a few words, when he declared, he would rather have five dollars than the mere sympathy of the whole world; and our opponents are just as shrewd as Josh Billings ever was. While we may be losing time and opportunities congratulating ourselves on the preponderance of public sympathy in our favor, they may be out after all the cash they can get by arguing to the investor or speculator that we are foredoomed to failure and that they have already triumphed.

There was a time when it was said of our opponents that they never rushed into print; but in that respect, also their former policy has been so completely transformed by the Independent movement that there is every reason for believing that like the big insurance companies and railroads, they have agencies at work, in the vain effort to divert and to direct public opinion in their favor, by means of news items and editorials in many of the newspapers. Reports have been sent out persistently from various places in our state within the past six months, which were plainly originated in the hope of convincing the public that our opponents had at last found a way to recapture that control of the exchange and toll business they originally had, but which the Independents have taken away from them in certain important localities of the state.

The director of the weather bureau for our state said in one of his recent annual summaries that the only unvariable thing about Iowa weather was its uniform variableness; and we can now say that the only thing to be expected in the way of tactics from our opponents is that the unexpected is sure to happen.

They maintained their fixed policy and their unchangeable plan until the Independent movement had driven their exchanges entirely out of existence in some places; and now, in the hope of preventing as far as possible the further growth of the Independent service, they have abandoned all of their former fixed rules of action and are resorting to tactics temporized to suit each particular case; and if they could convince the people of Iowa that they would always be a more obedient and trustworthy servant than we are they would triumph.

The "if" is too big. I do not believe that they, even with their twenty-five millions of new capital yearly, can cajole the common people over to the belief that they have the real servant spirit that is wanted. It remains, therefore, for us to convince the public, and keep it convinced, that while we must have reasonable profits, just as their farm laborers must have wages and as their grocer, blacksmith, banker and baker must have the wherewithal to live we claim no royalty rights, no franchise or monopoly powers of arbitary taxation, but do desire to serve faithfully our patrons and our stockholders to mutual advantage in this most trying and most important part of the public service of our day.

If we who call ourselves the Independents of Iowa should ever attempt to use our movement as a mere convenience for gaining the temporary power to tap the Iowa dairy men's cream cans, they would become as suspicious of our approach as they now are of the cream gatherer who represents the Milk street station. Our work is too important for us to make the mistakes our opponents have made.

If we should seek to be the master of our patrons we would compel them to overthrow us; but if we willingly serve our patrons and serve them better than our opponents, then and only then do we qualify above every protest under the present day theory of the divine and inevitable rights of servants.

All animals must have food and shelter; but man is the talking animal and we serve mankind in the highest social realm of communication. We are engaged in the development of the most important step in the unifying of mankind, industrially and socially, and in our business we need to ponder well the wisdom of that greatest of all admonitions, the ignoring of which has as we believe cost our opponents their chance to continued success:

"He that is greatest among you, let him be, not the master, but the servant of all."—*A Paper read by J. H. Shoemaker before the Iowa Telephone Convention.*

CARE AND MAINTENANCE OF EQUIPMENT.

While we are discussing the larger things that at present concern us such as "District and State Organization" and "Tactics of the Opposition" etc. it behooves us, not to forget the things at home that are going to make permanent organization possible and our fighting methods successful; that is the kind of service that we are giving, a thing which the "care and maintenance of our equipment" has largely to do. I will take the liberty of covering a large portion of plant equipment in a general way and in the manner that it effects us before the public and also somewhat as to detail and as to method.

Care must start at the beginning in this industry and continue throughout the construction and operation of the plants. Maintenance must not be taken to mean, entirely, the replacing or repairing something that has broken or given away causing the interruption in the service, but in the better sense, the anticipation of these troubles and the remedying of them before they actually occur. From the moment that a plant is constructed deterioration begins. And this cannot be taken care of by allowing it to go unheeded the allotted ten to fourteen years but to insure an efficient and dependable service must be as near as possible continuously maintained at the same standard as the original structure. In no other line of business is that old adage that "a stitch in time saves nine," so true as in the maintenance of telephone properties. Often the giving way of a single guy or corner causes poles and leads to fall like dominoes destroying more in a few moments time than can be overcome in weeks. Maintenance of to-day must be of a much higher standard than in time past. Then we might have expected the average subscriber to think that "morning zephyrs" and "slight dews" would interrupt their service but now the public refuses to "insulate themselves with that film of kindly stupidity" and demand service almost absolutely continuous, prompt and efficient. In order that fine apparatus shall deterioate slowly, do its work properly and positively, it must be treated with the utmost care and attention.

In this discussion I wish to divide the portions into office equipment, cables and aerial lines, and instruments.

Office equipment consisting of switchboards, racks and protection, and the connecting cables.

Switchboards are all of a more or less delicate nature and demand the maximum of care and attention. At no point are we so liable to have single cases of trouble multiplied as in the cord circuits and trunking devices on the board. To detail the many cases that present themselves and their troubles in detail would cover volumes of space and a great portion of time so they will be omitted here, except to caution that as the switching apparatus forms the central link in the system we must give it prompt and immediate attention and "keep everlastingly at it."

Complete and thorough, periodic tests should be inaugurated so that faults may be immediately located and repaired. Forms covering statement of all tests to be made and places for reports, with instruction will help materially in securing the best results. Cleanliness in switchboard and rack rooms the elimination of dust and dirt go a long way toward minimizing troubles such as poor contacts, cross talk and kindred ailments.

Office cables, whether dry core or parafined, take up moisture

very easily causing induction troubles if nothing more serious. To prevent this the original installation should be made in a building or rooms where an even dry temperature can be maintained and cables kept from the floor where moisture might collect or become damp from water used in mopping, etc. It is necessary to boil these cables with bee's wax and parafine or otherwise drive out the moisture when they become damp.

It is necessary that the office equipment be properly protected from both lightning and foreign currents. On small boards and in small places where the liability of crosses with electric light or trolley wires are small ordinary Postal or Western Union type fuses are used for the latter and carbon block for the lightning. Care should be taken to insure proper grounding of the arrester buss, also that it is not made through cable sheaths or other than the main exchange ground. Racks should be wired with a fireproofed wire and be kept free from dirt and moisture.

Cables, while furnishing a convenient and reliable method of carrying a large number of lines, must be the more thoroughly watched and cared for. When properly cared for cables deteriorate slowly but may under adverse conditions become useless in a very short period of time. The most common cause for trouble is due to holes in the sheath and is caused in many ways. Heavy currents often cause burning of holes, but this may be overcome when the current is on sheath or messenger by hanging the cables on Marlin hooks and bonding the sheath to the messenger and the latter to the ground. Marlin hangers are mentioned for the reason that it has been our experience that old metal clips of the zinc strap type, that should a bond break or in the case of unbonded cables, holes are often burned under several clips instead of in one point, under like circumstances with the Marlin hooks; also that these burned places are often entirely covered by the clips and are hard to locate until after moisture may have entered the cable through them. Excessive vibration should also be avoided such as hanging cables on portions of bridges that are subject to vibration, or on street car poles as this will cause the lead in places to become crystalline and porous, making it often necessary to replace entire portions of cable. To protect against lightning and foreign currents being brought into the cables from aerial lines, carbon blocks and fuses should be installed at the terminal pole as well as at the office end. Where there is no danger from foreign currents such as electric light and street car currents the carbon block alone will suffice, while for small terminals on short cables used only for service wire purposes protection at the out end may be omitted with safety. Arresters must be inclosed in weather-proof cans or boxes as the carbon blocks absorb moisture quite readily. Mica or celluloid will also be found preferable over silk between blocks in outside terminals.

When the insulation drops down in paper wrapped cables the trouble may be located by the use of the Varley or Murray loop test, or if the necessary "bridge" is not at hand, by careful examination of the cable sheath. When the low point, is found, which should be at the earliest possible moment after we have knowledge of it, and is due to the presence of moisture, it is necessary either to open the sheath and force the water out by boiling with hot parafine, above the boiling point of water and not hot enough to char the paper insulation, or possibly where the moisture has penetrated a considerable distance or been present for some time it may be necessary to connect in a new piece of cable, covering the open portion with a new sheath and wiped joints. Cables left open or exposed to the air will collect sufficient moisture to seriously impair the insulation. Cable ends should always be sealed by soldering when cut and to be left for any length of time. In the average plant it will be found to advantage to use lead sleeves and wiped joints in preference to patent joints, though defective plumbing is often the cause of cable troubles.

The life of cables is governed largely by the method in which they are put up. For instance if a cable is placed on a messenger of exactly the same length, especially in iron messengers, when the messenger elongates, which it eventually will, the cable becomes drawn tight against poles and clips at turns or corners (if placed on the outside of such turns) and on a slack messenger, the swing is sufficient to break the sheath at the pole. Plow steel is coming more and more into general use because of its ability when properly guyed to keep its position and also the advantage of using a smaller messenger.

The maintenance on heavy aerial leads, is one of the hardest problems that we have to contend with. Original construction has to do largely with its economical success. If such leads are well guyed, head and side, as may be necessary and all lines are placed in the best possible shape, it is entirely possible to eliminate the ordinary run of open wire trouble.

The matter of induction, noisy lines, and the small aggravating things that occur often on the lines, must be eliminated. Cases of that sort must be given the same immediate attention that we give the lines that are out of service.

While in the average plant it is the instrument itself that receives the last attention we must not forget that this telephone is our representative before the subscriber, and as its appearance is and as its part is done in the perfecting of the service depends the satisfaction that we are received by the public.

Frequent inspection should be made and a thorough overhauling of the instrument should be made periodically, more often with telephones of the local battery magneto-call type due to the larger number of contact parts and also that minor troubles may exist much more readily than with central energy equipment. It is not only essential that the respective mechanical parts of the instrument be in the best of shape but also that the general appearance be the best possible, for with the average user the appearance goes a long ways toward conviction that the rest of the service is satisfactory. A judicious use of furniture and nickel polish will do wonders in this line.

Great care should be taken in the installation of the instrument to insure it from mechanical injury as well as the house wiring to insure continuous operation and low maintenance cost. Soldering of all connections takes but little time in the beginning and saves the maintenance force much labor and consequent expense.

Methods of taking care of trouble reports and the clearing of them are many and varied, but I will here give a plan that is in general use. A "morning test" which covers a test of all the lines on the exchange furnishes a ready and rapid method of locating any trouble and is usually checked on stock forms numbered from one to one hundred. These numbers are marked with certain characters to show the trouble with that line or carried to the back of the slip and there carried out in full. Then transferred to the usual form of trouble ticket, showing number of ticket and line together with the nature of trouble, time reported and any additional information that might be of assistance to the trouble man in locating and clearing the trouble, such as cable pair number, equipment record, etc. If these tickets are methodically kept and the cause of each case and the repairs made are thoroughly reported, a thorough analysis of the trouble may be made, cutting down the number of repeating or recurring cases, eliminating those chronic cases and showing us where the particular plant may be weak in a certain way that we may make the necessary corrections.

By filing these tickets in order of the line numbers, we have a complete record that will show us the exact number of cases of trouble on each line and the reason. There is usually a remedy. In cases of the repeating or chronic nature a good "follow up" works to a good advantage and I believe places us in a good light before the public. Mr. Plaister, of Ft. Dodge, has devised a good method along this line, by using a return postal card it becomes necessary for the subscriber to make specific complaint or by failing to reply admit no further cause. A show of interest along this line certainly cannot hurt us with our subscribers. It is just as essential that public opinion be well taken care of as anything else.

Let us establish methods in our exchanges that will enable us to anticipate trouble or at least have knowledge of it before the subscriber does, also record and care for these reports with dispatch. Try in fact, the "Schwab" deadly parallel system on ourselves. Get after these things, don't dodge them. Be our own most severe critic of service, when we, in our search have found cause for complaint, remove the cause.

If we are to maintain efficiency it is necessary that we use system and discipline and both must begin with ourselves. Cut out the misspent energy.—*A Paper read by R. A. Walker before the Iowa Telephone Convention.*

THE BEST METHOD OF KEEPING LOCAL SUBSCRIBERS' TOLL ACCOUNTS.

Managers of the larger exchanges will undoubtedly agree that the keeping, collecting and recording of small local toll accounts is a source of considerable trouble, expense and loss to their exchange.

The majority of the accounts are small and distributed over the entire exchange, and are of such a nature as to make monthly collections almost imperative, in order to prevent too great a shrinkage; the loss of a toll bill is usually more than a total loss as you are in most cases obliged to settle with some foreign line for mileage or terminating fee.

There are naturally many different plans or methods for the handling of this part of the business, almost as many, I might say, as there are exchanges. Some have a subscribers' toll ledger kept in alphabetical order containing a record for a year or more, besides the regular monthly toll bills and toll checks; others make a carbon duplicate of each toll ticket which are kept in an envelope and sent to the subscriber with the toll bill, at the end of the month, a most unclean and unsatisfactory arrangement. The card index is used by many, and so on down the line, the majority of them more or less complicated and cumbersome, but by far the greatest objection to nearly all of the methods is the inability of the manager or any one to look over the unpaid accounts for any month or number of months in a few moments without being obliged to go over the record of all of them page by page, or card by card.

In my efforts to find some one scheme that would give a permanent duplicate record with the minimum amount of work and expense and without complications, (I believe we have tried them all), I have finally settled upon the present system in use in our exchange in Cedar Rapids which I will endeavor to explain to you.

The ordinary toll ticket giving all the necessary information is used by the toll operators, from which the office record is made, by the toll clerk in the following manner. The toll tickets are carefully examined on the day succeeding the service and while the transac-

tion is still fresh in the minds of all, and any inaccuracies or omissions corrected at once. The tickets are then placed in numerical order beginning with the lowest number. They are then immediately entered upon an individual subscribers toll bill, under the telephone number, the name naturally being placed on the bill. Each bill is provided with a stub at the top on which is given, first, the month, the telephone number, subscriber's name, amount of toll, messenger service and total, with a space for date paid; below the perforation of the stub is given the telephone number, name and month the service is rendered. The body of the bill gives the date, toll, messenger service, and total, by whom, to what place, to whom, of each completed call. These bills are made in two parts perforated through the center, the back half of which is blank for the carbon record. Each bill is supplied with a carbon sheet which remains in the bill undisturbed until the end of the month when the bill is completed. On the first day of the month as soon as the proceeding day's business has been entered, these bills are footed and the totals placed upon the stub at the top of the bill. The bill is then torn into and the carbon removed, the bills sorted into routes as per the route letters and numbers, when they are given to the collectors. It is thereby possible with ease to have the bills out on the second working day of each month. For easily handling the bills and keeping them in good condition and in order, the toll clerk has several files, boxes, in which the bills are placed in their regular numerical order. A smooth strong cardboard is placed betwen each 100 so that it acts as an index when handling the bills.

From the carbon sheets the total amount of toll charged to each subscriber's telephone number is immediately entered in the subscriber's ledger under the proper month on the same line as the subscriber's rental, so that the total amount due for rental and toll can be seen at a glance. The carbon sheets are then filed numerically in a box file labeled with the month as shown. As the bills are paid the carbons are taken out marked paid, and filed away in a paid file, at the same time the subscriber's account in the ledger is credited paid. The stubs are carefully preserved and are filed away, each day's collections being fastened together after the proper entries in the cash book. We therefore have the original toll ticket, a carbon copy of the toll bill and the collector's stub as an office record.

You will notice that all of these records are kept under the telephone number which does away entirely with the necessity of an index of any description; as the tolls are paid the carbon duplicates in the unpaid file gradually decrease until the entire month's business has been collected. You can readily see how easy of access and how quickly the unpaid bills can be looked over and any questionable ones given special attention, and at the same time how with little or no delay a disputed bill can be verified. You will readily agree that it requires prompt and accurate information and complete records to satisfy a dissatisfied subscriber.—*A Paper read by H. A Douglas before the Iowa Telephone Convention.*

TOLL SERVICE.

Before considering in detail the subject assigned me by your program committee, it may not be out of place to make a few remarks by way of calling your attention in a general way to certain facts with which you are, or should be, intimately acquainted.

As late as 1902, a large number of the Independent companies were furnishing at least one-third of their toll service over grounded lines, and, as there were but few parallel lines, the service to points within a radius of fifty miles was fairly satisfactory.

From 1902 to 1905 inclusive, the Independent companies were practically forced to wrestle catch-as-catch-can with the farm line proposition, and in a great many instances neglected, or at least failed to improve their toll service as they should have done, presumably on account of financial matters.

During this period the whole country was cob-webbed with farm lines built by so-called "mutual" companies that claimed to operate without profit and by others who wished to be classed as "commercial companies," many of whom had the impression that they were operating at a large profit, and who subsequently became painfully aware that they were not—at least not to the extent they figured on paper at the early stage of the movement.

During the time that the farm line feature occupied the center of the stage and absorbed the attention of the various Independent companies, our competitor, otherwise known as the Iowa Telephone Company, was active in the improvement of their old toll lines and the building of new ones, and is now making a desperate effort to capture our friends owning the mutual or rural lines, using the argument that they can talk anywhere over their vast system, but failing generally to inform the prospective sublicensee that there is a small fee attached to each message over their lines, not necessarily for publication, but as an evidence of good faith, as our newspaper friend would say.

Possibly I have digressed in the recital of what has and what has not been done, but as a condition, not a theory, confronts us, is it not well to face it fairly and squarely and discuss ways and means whereby we may improve and further harmonize Independent telephone interests?

Practically all the income of a telephone company is derived from the rental of instruments and the use of its long-distance lines for commercial messages and leased wire service.

In order to obtain and keep the good will and patronage of the public it is necessary that both classes of service, exchange and long-distance, be maintained in a high state of efficiency, otherwise confidence will be lost in our ability to "deliver the goods," as it were, and a corresponding decrease in receipts will be noticeable.

Assuming, therefore, that the exchange end of the service is all that it should be, let us consider the trunk line or toll service part of our system.

The question of standardization of toll lines and equipment, about which so much has been said and written, is apparently as far from settlement as ever, and we must therefore make the best of what we have. With this in view, each company should endeavor to improve its toll service by changing any grounded toll lines they may have to metallic and balance them by transposing these circuits according to the standard approved by recognized telephone engineers. Having put your lines in good condition, see to it that the calls are properly supervised, as this is a very important matter, requiring the best talent obtainable. Operators cannot perform their duties satisfactorily if required to handle two hundred exchange subscribers, as many more in the country and four or five toll lines, and yet we frequently find this state of affairs. With such a load all classes of service must necessarily suffer, and we not only receive the criticism justly our due but are soon made unpleasantly aware of opposition that, sooner or later, will assume dangerous proportions.

Again, we too often find that operators are employed because they are relatives or friends of some influential officer or stockholder, rather than on account of their fitness for the position.

Competition is now so sharp, and the demands of the public so exacting, that it is imperative that strictly business principles be used in the handling of our telephone interests. With lines working as they should and efficient operators employed, the question of a time limit on messages presents itself for consideration. I believe there is no question that we are altogether too liberal or negligent in this matter, and in fact the public seems to feel that it has a license to use Independent lines as long as they choose without the payment of overtime. This condition generally prevails throughout the state and exists solely by reason of the lax methods of the Independent companies. The necessity of enforcing a time limit is more and more imperative as our ability increases to handle messages satisfactorily over long distances.

A three-minute service with lines working right, should be the limit for toll messages with additional compensation for each minute, or fraction thereof, overtime.

I am aware that there are many difficulties in the way of accurately timing messages at all stations, but it can be done at many of the larger ones and the operators or toll agents at the smaller stations can be prevailed upon to not allow patrons to use the line for an indefinite period, as has been the practice with many of them. If we were more strict with regard to the use of our toll lines, and insisted upon an accounting for each and every message handled over them, whether paid or dead-head, our service would be valued more highly, and the financial gain at least one-third greater than under the present free and easy custom. If, after having adopted more stringent rules, you find that you are handling forty messages, or more, per day over any particular circuit, it is time to arrange for additional facilities. At first thought this may seem a small number, but a little calculation will convince you that if this average is maintained, a reasonable return on the investment will be realized.

We are now furnishing the public long-distance service, in which the lines of a number of companies are used, and it is only fair that the toll charges be divided in an equitable manner. Heretofore, and in fact at the present time, the question of what to do with the money that we receive was easily solved—we kept it, or as one of our prominent telephone men, now holding a high office with this association and who is noted for his originality, recently remarked, it was a case of "Get all you can, and can all you get." This condition has existed mainly because the interested companies were busy with other problems and attended to those which seemed more urgent, postponing definite action on what is really the most important subject of all.

For several years the matter of establishing a clearing house for the settlement of interchanged business has been agitated, but until a few months ago nothing tangible has resulted. Last May, however, a number of telephone men met at Webster City, in response to an invitation from E. H. Martin, to consider the establishing of a checking or auditing bureau. The result of the meeting was that a committee consisting of E. H. Martin, Webster City; Chas. C. Deering, Boone; P. C. Holdoegel, Rockwell City; J. M. Plaister, Ft. Dodge, and Chas. C. Cockerill, Sioux City, was appointed and authorized to incorporate the Independent Telephone Clearing House with principal office and place of business at Des Moines, Iowa.

The committee was enthusiastic, worked hard, and has something to show for its labor that all of us should be proud of. The clearing house is now established on a safe and sound footing and about whose workings and future aims you will be enlightened by its able manager, Mr. Geo. T. Hewes.—*A paper read by George N. Bandy before the Iowa Telephone Convention.*

PROGRESS OF THE MONTH

Compiled by H. A. Downey

NEW COMPANIES

EDNA, Kans.—The Edna Telephone Company has been incorporated.

DEERHEAD, Kan.—The Ranchmen's Telephone Company has been incorporated.

MT. CLIFFTON, Va.—A telephone company has been incorporated at this place.

MARIETTA, Ill.—The Marietta & Seville Telephone Company has been organized.

PLAZA, Wash.—The Plaza Telephone Company has been organized at this place.

SILVER CREEK, Neb.—The Silver Creek Telephone Company has been incorporated.

MUNDEN, Kans.—The Farmers' & Citizens' Telephone Company has been incorporated.

SARGENT, Neb.—The Sargent Independent Telephone Company has been incorporated.

AUGUSTA, Kan.—The Rose Hill & Augusta Telephone Company has been incorporated.

SARCOXIE, Mo.—The Sarcoxie Telephone Company has been incorporated at this place.

MARQUAM, Ore.—The Marquam Mutual Telephone Company has been organized at this place.

PRESTON, Ia.—The Farmers' Mutual Telephone Company has been organized at this place.

BURLINGTON FLATS, N. Y.—The Burlington Flats Telephone Company has been organized.

BRITTON, S. D.—The Commercial Club of this place has organized the Social Telephone Company.

CHADWICK, Ill.—The Mutual Telephone Company has been organized with James Taylor president.

EAGLE, Nebr.—The Eagle Telephone Company has been incorporated with a capital stock of $3,000.

REEMAN, Mich.—The Reeman Telephone Company has been incorporated with a capital stock of $150.

FRANKFORD, W. Va.—The Frankford Telephone Company has been incorporated with a capital stock of $6,000.

BALATON, Minn.—The Current Lake Telephone Company has been incorporated with a capital stock of $10,000.

SMARTVILLE, Neb.—The Johnson County Telephone Company has been incorporated with a capital stock of $50,000.

FREDERICK, Okla.—A telephone company has been organized at Frederick and a line will be constructed to Manitou.

NELSON, Minn.—The Nelson Telephone Company has filed articles of incorporation with a capital stock of $10,000.

LONGSWAMP, Pa.—An Independent telephone company has been organized at this place, which will establish an exchange.

NEW ORLEANS, La.—The Tulane Telephone and Telegraph Company has been incorporated with a capital stock of $2,000,000.

PAGE, Nebr.—The Farmers' Telephone Company has been organized at this place and will construct a line to Hainesville.

PULASKI, Wis.—The Pulaski Telephone Company has been incorporated with a capital stock of $800 by H. Rosenau and others.

SALMON, Idaho.—The Lemhi Telephone Company has been incorporated and will build a telephone line from Salmon to Dubois.

ECHO, Wash.—The Echo Valley and Colville Telephone Company has been incorporated by W. I. Russell, George K. Armstrong, and others.

BEAVER, Wis.—The Unity Western Telephone Company has been incorporated with a capital stock of $650 by George H. Stone and others.

BARBERTON, O.—The Barberton Telephone Company has been incorporated with a capital stock of $50,000. A new telephone plant will be installed.

NOBLE, Tex.—The Farmers' Telephone Company has been chartered here by A. L. Lewis, A. J. Burkett, W. E. Davis, A. Flitner, and R. F. Ellinger.

MACON, Ga.—Messrs. N. M. Block, Louis Block, Samuel Block and Malcolm D. Jones have filed a petition asking the superior court to allow them to change the name of the Dublin Telephone Manufacturing Company to the Dublin Telephone & Telegraph Company.

SMITHFIELD, Neb.—The Smithfield Mutual Telephone Company has been incorporated with a capital stock of $3,000 by George C. Junkin and others.

MILLSTADT, Ill.—The West Side Telephone Company has been incorporated with a capital stock of $1,140 by William Kropp, Jacob Fischer, G. A. Mueller.

SPRINGDALE, Wash.—The Forest Center Telephone Company has been organized to build a telephone line from Springdale through Forest Center to Grays.

LENZBURG, Ill.—The Risdon Telephone Company has been incorporated with a capital stock of $500 by Henry Kirchoefer, Henry Gruenewald, Fred W. Wasem.

EAST ST. LOUIS, Ill.—The Dupue Telephone Company has been incorporated with a capital stock of $10,000 by Levis Beauman, L. O. Whitnel and W. H. Garlan.

MILWAUKEE, Wis.—The Milwaukee Telephone Company has been incorporated with a capital stock of $100,000 by Bernard C. Roloff, Charles L. Goss and Paul Stover.

TYLERSVILLE, Pa.—An Independent telephone company has been organized at this place and the purpose is to construct a telephone line from Tylersville to Loganton.

HOHENWALD, Tenn.—An Independent telephone company has been formed here with the following officers: President, C. D. Loveless; secretary, J. F. Whitwell.

TRUMANSBURG, N. Y.—The East Steamburg Telephone Company has been incorporated with a capital stock of $5,000 by Frank Anable, Charles L. Bond and Wm. P. Ballard.

BELLEVILLE, Ill.—Articles of incorporation have been filed in the recorder's office for the West Dozan Telephone Company by R. I. Wilson, W. H. Miles, and John Fauth.

MT. PLEASANT, PA.—A telephone company is being organized by the farmers of Mt. Pleasant township with a capital stock of $3,000, to connect with the Mt. Pleasant system.

HENNESSEY, Tex.—The College Corner Rural Telephone Company has been incorporated with a capital stock of $400 by Robert L. Sutton, George Gray and James Walta.

STATESVILLE, N. C.—The Irdell Telephone Company has been incorporated, with a capital stock of $50,000. The incorporators of the company are J. K. Morrison and others.

BELT, Mont.—The Belt Valley Telephone Company has been incorporated with a capital stock of $25,000, by C. E. K. Vidol, J. K. Castner and A. P. McAnley, all of Belt.

MINERVA, O.—The Minerva Telephone Company has been incorporated with a capital stock of $4,000 by E. D. Shaw, R. T. Davis, A. A. Bates, B. C. McCauley and W. E. Russell.

ATTICA, Wis.—The Attica Mutual Telephone Company has been incorporated with a capital stock of $10,000 by Oliver S. Jones, Herbert E. Ludington and Chauncey T. Bartlett.

BOLTON, Kans.—The Central Bolton Telephone Company has been organized and the following officers elected: President, J. A. Ramsey; secretary and treasurer, Roy F. Greene.

CHARLESTON, Ill.—A company has been formed with a capital stock of $1,500, to build telephone lines in Hickory and Morgan townships. H. L. O'Hair is president of the company.

AMITY, Pa.—An Independent telephone company has been organized at this place with the following officers: President, Frank H. Condit; secretary, C. N. Tharp; treasurer, John Cary.

WAKEMAN, O.—The Todd Corners Telephone Company has been incorporated by the following: S. H. Todd, M. I. Todd, W. H. Hayes, A. J. French, F. M. Arnold, M. E. D. Green.

PEKIN, Ill.—The Peoria, Pekin & Tremont Telephone Company has been incorporated with a capital stock of $2,500. The incorporators are A. J. Davis, Walter H. Ames, S. A. Hayward.

GRASSLAKE, Mich.—The Grasslake & Sharon Telephone Company has been incorporated with a capital stock of $1,000. The directors are W. G. Alber, John Lemm, and A. L. Holden.

BURLINGTON, Vt.—The Burlington Home Telephone Company has been incorporated, with a capital stock of $100,000. Patrick Tierney, of Plattsburg, N. Y., is one of the incorporators.

SAYRE, Okla.—The Modern Telephone Company, with headquarters at Sayre, has been incorporated with a capital stock of $10,000. The directors of the company are D. E. Grubs, O. J. Ivester, L. P.

Jones, and Robert Rice of Sayre, and T. S. Wilson of Prentiss, Okla.

JEFFERSONVILLE, Ind.—The Jeffersonville Home Telephone Company has been incorporated with a capital stock of $10,000 by the following: Jacob Eberts, Froman M. Cook, Floyd Parks.

CHARLESTON, Ind.—Articles of incorporation have been filed with the county recorder, for the Home Telephone Co. It is said to be the purpose of the new incorporation to cover Clark County.

NEW ATHENS, Ill.—The Dutch Hill Telephone Company has been incorporated with a capital stock of $480. The incorporators of the company are John H. Feurer, Peter Knewitz, Henry Wildy.

DUNDEE, N. Y.—The House Hill Telephone Company has been incorporated with a capital stock of $2,500 by Frank Ellison, Mott Honeywell, and William Paulding, all of Dundee, and others.

NEW YORK, N. Y.—The Cream City Telephone & Telegraph Company has been incorporated, with a capital stock of $125,000, of which $10,000 is represented by property located in Wisconsin.

HERRICK, Ill.—The Herrick Telephone Company has been incorporated with a capital stock of $2,500. The incorporators of the company are A. L. Chamberlain, Harry Hinton and W. Wooters.

MT. OREB, O.—The Mt. Oreb Telephone Company has been incorporated with a capital stock of $10,000 by A. R. Watson, George E. Kratzer, P. A. Wickerham, L. H. Leonard and McCray Vance.

WAYNE, Neb.—The Wilbur Telephone Company has been incorporated with a capital stock of $2,800. The incorporators are W. H. Bueton, F. M. Griffith, A. Grier, Ferdinand Thim and John Harder.

WHITEHALL, Mont.—The Montana Co-operative Telephone Company has been organized at this place, and the following officers have been elected: President, F. L. Grandy; secretary, John B. Wellcome.

NEW PHILADELPHIA, O.—The People's Telephone Company has been incorporated with a capital stock of $5,000 by J. K. Johnstone, C. H. Slingluff, E. B. Mather, J. H. Reiser and Fred L. Livingstone.

YORKVILLE, Tenn.—The Yorkville Telephone Company has been chartered with a capital stock of $5,000. The company already has about 50 miles of lines connecting a number of towns in the vicinity.

ATKINSON, Nebr.—The Citizens' Telephone Company has been incorporated with a capital stock of $5,000 by James F. Brady, C. E. Haven, J. A. Robertson, R. O. Clifford, W. L. West and F. H. Swingley.

CLINTON, Okla.—The Clinton Mutual Telephone Company has been incorporated with a capital stock of $1,000. The directors of the company are F. G. Cope, J. D. Kiletrell, and F. A. Wadleigh, all of Clinton.

NOBLE, Okla.—The Farmers' Telephone Company of this place has been incorporated with a capital stock of $1,000. The incorporators are A. L. Lewis, A. J. Burkett, W. E. Davis, A. Flitner and R. F. Ellinger.

REE HEIGHTS, S. D.—The Ree Hills Telephone Company of this place has been incorporated with a capital stock of $2,000. The incorporators are B. S. Bell, John Hale, R. W. Speirs and others of Ree Heights.

GEORGETOWN, O.—The Brown County Independent Telephone Company has been incorporated with a capital stock of $10,000 by Louis Mischler, E. H. Kennedy, C. E. Biehm, J. H. Williamson and Lewis H. Wolfe.

HEASTON, Okla.—The Heaston and El Reno Telephone Company has been incorporated with a capital stock of $5,000 by Charles Brandley, J. W. Cordrary, and W. T. Foster of El Reno, and W. D. McKay of Heaston.

PALO PINTO, Tex.—The Mount Zion and Lost Creek Telephone Company has been incorporated with a capital stock of $1,000. The incorporators of the company are W. H. Rix, J. L. Deaton, R. M. Vaughan, and others.

ALPENA, S. D.—Articles of incorporation have been filed for the Alpena Farmers' Telephone Company with a capital stock of $4,500. The incorporators of the company are J. E. Shull, Michael Wahl, H. Erikson of Alpena.

SOUTH BUTLER, N. Y.—The Butler Independent Rural Telephone Company has been incorporated with a capital stock of $1,000. The incorporators are John B. Atkins, Butler; S. H. Viele and L. I. Douglass, South Butler.

DOTYVILLE, Wis.—The Eastern Fond du Lac County Telephone Company has been incorporated with a capital stock of $5,000. The incorporators of the company are J. M. Stack, Thomas Timblin, J. Rohlfs, and A. J. Morse.

PLEASANT LAKE, N. D.—The Pleasant Lake Telephone Company has been incorporated with a capital stock of $5,000 by L. M. Holbrook, Anton Burow, James R. Watson, W. F. Hanks, Pleasant Lake; Ole Paulson, Fero.

OSWEGO, N. Y.—The Southwest Oswego Telephone Company has been incorporated with a capital stock of $600. The incorporators of the company are Frank McBride, Frank J. Eaton, Percy Flack, all of Oswego, and others.

DILLER, Nebr.—Farmers living northwest of this place have organized the Farmers' Co-operative Telephone Company. The directors of the company are Roy Diller, G. W. Rohrabaugh, C. C. Blauser, J. A. Price and others.

CAMPBELL, Cal.—The Farmers' Mutual Telephone Company has been organized with the following officers: President and manager, C. F. Ringe; vice president, F. M. Righter; secretary, A. C. Keesling; treasurer, J. M. Butts.

LAKE CITY, Colo.—The Pittsburg & Colorado Telephone Company has been incorporated by D. E. Weir of Pittsburg and W. C. Pitts and W. C. Blair of Lake City to build a telephone line from Lake City to Animas Forks.

WACO, Tex.—The Waco Electrical Supply Company has been incorporated in this city with a capital stock of $10,000. The incorporators are M. F. Wortham, A. H. Bell, M. T. Bell, Abe Gross and J. B. Earle, all of Waco.

NEW RICHLAND, Minn.—Articles of incorporation have been filed for the New Richland Telephone Company, with a capital stock of $20,000, by M. A. Hodgkins, H. E. Johnson, P. O. Sunde, and others, of New Richland.

BOUGHTONVILLE, O.—The Boughtonville Telephone Company of Huron county has been incorporated with a capital stock of $10,000 by W. G. Blackmore, J. O. Palm, G. D. Catlin, S. E. Gleason, F. E. Hole, William Howard, and others.

OCOYA, Ill.—The Eppards Point Telephone Company has been incorporated with a capital stock of $25,000. The directors are as follows: W. W. Osborn, W. W. Wagner, W. E. Fisk, W. B. McElhiney, H. M. Reed and F. Kipfer.

ADRIAN, Minn.—The German Telephone Company has been organized and the following officers elected: President, Al Faragher; secretary, H. L. Prideaux; treasurer, H. Hennekes; directors, Gerhardt Lewis, Ed Davis, John Schultz.

DALLAS, Wis.—The farmers of Dallas and Maple Grove have organized a co-operative telephone company with the following officers: President, Ben Massie; secretary, Frank Garner; treasurer, John Hanson; director, J. S. Hegtwet.

MANGUM, Okla.—The Mangum Telephone Company has been incorporated with a capital stock of $100,000. The incorporators of the company are A. Gordon, Excelsior Springs, Mo., and D. D. Taylor and D. H. Wright of Mangum.

MURPHYSBORO, Ill.—The Murphysboro Telephone Company of Murphysboro has been incorporated, with a capital stock of $10,000. The incorporators of the company are as follows: A. B. Minton, Thos. M. Logan and W. C. Alexander.

OTTWAY, Tenn.—The Ottway Telephone Company of Greene County has been chartered with a capital stock of $320. The incorporators are W. H. Smith, J. O. Young, Jacob Wiloughby, R. A. Bosby, W. W. Casteel, J. M. Casteel.

HAYES CENTER, Nebr.—The Medicine Valley Telephone Company has filed articles of incorporation with the secretary of state. The capital stock is $1,500. The officers of the company are: President, R. P. Chase; secretary, J. C. Ready.

LAMAR, Mo.—The Missouri Exchange Telephone Company has been incorporated at Lamar with a capitalization of $10,000. The incorporators of the company are as follows: B. M. Guinney, S. F. Snodgry. Maybelle Guinney and others.

LOWELL, Me.—The West Lowell Telephone Company has been incorporated with a capital stock of $1,000. The officers of the company are as follows: President, W. S. Fox, Lowell; treasurer, G. M. Andrews; clerk, M. A. LeBaron, Lowell, Me.

PORTLAND, Me.—The People's Telephone Company has been incorporated with a capital stock of $30,000. The officers of the company are: President, M. B. Jones of Newton, Mass.; treasurer, C. H. Adams; clerk, Frederick Hale, both of Portland.

KELLER, Wash.—The Keller & San Poil Telephone & Telegraph Company has been incorporated. The capital stock of the company is $10,000 and the incorporators are P. Connery, W. L. Murphy, C. A. Gray, R. L. Boyle and H. A. Denton, all of Keller.

TORONTO, Ont.—The Denorwic and Gold Mines Telephone Company, Limited has been incorporated with a capital stock of $40,000, to construct and operate a telephone system in the Rainy River district. The headquarters of the company will be Toronto.

RICHARDTON, N. D.—The Richardton Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are Joseph Kilzer, Fred Koesel, D. P. Abby, Fred Pathman, R. J. Fleck, John H. Breum, Lewis Davis, all of Richardton.

BOYDSVILLE, Mo.—The Boydsville, Englewood & Ginlet Telephone company has been organized. The officers are as follows: President, A. L. Barker; vice-president, T. B. Jenkins; secretary and treasurer, C. W. Betz; managers, J. W. Goodwin and C. W. Betz.

STEUBENVILLE, O.—The Republic Telephone Company has been incorporated with a capital stock of $25,000 to operate in Toronto,

Empire and New Cumberland. The incorporators are J. G. Gilchrist, R. Gilson, W. C. Jones, Lee O. Smith and J. T. Campbell.

LINCOLN, Nebr.—The Marion Township Telephone Company of Franklin county has filed articles of incorporation with the secretary of state. The capital stock is $1,000 and the incorporators of the company are R. N. Crawford, L. N. Wentworth, and S. E. Pecht.

CARTER, Wis.—Articles of incorporation have been filed with the secretary of state by the Carter & Wabeno Telephone Company, with a capital stock of $2,000. The incorporators are N. W. Johnson, Ervin Hemenway and W. S. Slater of Carter, and Al. Johnson of Laona.

ENDERLIN, N. D.—The Moore & Liberty Telephone Company has been incorporated with a capital stock of $50,000. The incorporators of the company are John Asheim, Ole Christianson, E. O. Fauseth, John Kaber, Espen Groth, Harry A. Pherigo, Enderlin; Geo. Olson, Sheldon.

ENON VALLEY, Pa.—An Independent Telephone Company has been incorporated at this place with a capital stock of $10,000. The incorporators are O. I. Riddle, G. H. Dilworth, J. H. Russell, F. R. Wilson, B. F. Gealy, J. W. McGinnis, F. R. Robinson, M. E. Martin and others.

ENON VALLEY, Pa.—The Enon Valley Telephone Company has been incorporated with a capital stock of $10,000. The directors of the company are O. L. Riddle, John W. McGinnis, J. H. Russell, L. R. Wilson, F. R. Robertson, G. H. Dilworth, B. T. Greely of Enon Valley

HAGANS, W. Va.—The Behler-Hagans Telephone Company has been incorporated, with a capital stock of $24,000. The incorporators of the company are J. W. Kennedy, Nixon Michael, Norman Cordray, of Behler, W. Va.; C. C. Michael, J. L. Eddy of Arnettsville, W. Va.

MONACA, Pa.—An Independent Telephone Company has been organized by the citizens of Raccoon township, for the purpose of building a telephone line to connect with the Beaver County Telephone Company's lines at this place. R. R. Ewing is president of the company.

SENTINEL BUTTE, N. D.—The Billings County Local and Long Distance Telephone Company has been incorporated with a capital stock of $10.000. The incorporators of the company are R. L. Barnett, Harve Robinson, J. B. Stoddard, Lewis F. Crawford, W. G. Lang, all of Sentinel Butte.

PALERMO, N. Y.—The Palermo Telephone Company, recently organized, will be incorporated with a capital stock of $1.500. The directors of the company are C. D. Trimble, F. D. Stone, Glen Trimble, F. A. Moore, E. A. Howard, G. W. Dennis, J. H. Mace, Ira Flint, and F. A. McCullom.

DODGE, Neb.—The Bohemian Mutual Telephone Company has been incorporated with a capital stock of $600 by the following: J. K. Vlach, Frank Musik, Vaclav Vlach, J. V. Dostal, George Frie, Anton Karnik, Frank J. Hanzel, William Uher, V. J. Tichota, Frank Stecher, Sebasta Sladovnik.

GUTHRIE, Okla.—The Alpha Mutual Telephone Company of Rock Falls township, Kay county, has been incorporated with a capital stock of $1,000 by the following: Ed Lindsay, D. F. Gilmer, J. Burgett, T. M. Gray, J. O. Lucas, living in Kay county, with post office address at Hunnewell, Kan.

SEDRO-WOOLLEY, Wash.—The Skagit Independent Telephone Company has been organized with a capital stock of $20,000, fully paid, and its object is to furnish this city with a complete local telephone system and to extend its lines as far east as Marblemount and south as far as McMurray.

LETTS, Ia.—The Muscatine & Louisa County Telephone Company has been incorporated with a capital stock of $25,000. The directors of the company are W. W. Wagner, J. H. Letts, Garry Stapp, J. L. Thurston, Chas. N. Johnson, C. Estele, Joseph Meeker, C. A. Carpenter and D. H. Westbrook.

LEVEL RUN, Va.—The Renan Telephone Company has been incorporated with officers as follows: President, W. C. Harvey, Renan; secretary and treasurer, E. A. Smith, Hurt, Va. Capital stock, maximum, $5,000; minimum, $1,000. It is the purpose of the company to erect and maintain a telephone line.

STEVENSVILLE, Ont.—The Welland County Telephone Company has been incorporated with a capital stock of $40,000 to carry on a general telephone business throughout the county of Welland. The provisional directors are J. Pierson, C. E. Sauer, S. H. Tripp, P. A. Storm, T. Glenny and W. Robinson.

PORTLAND, Ore.—Articles of incorporation have been filed with the secretary of state for the Cedar Creek Mutual Telephone Company; principal office, Harding precinct, Clackamas county, Ore. The capital stock is $2,500 and the incorporators are W. P. Kirchem, Louis Funk, J. L. Stewart and Fred Gerber.

PARKLAND, Okla.—Articles of incorporation have been filed for the Star Rural Telephone Company of Parkland, with a capital stock of $10,000. The incorporators of the company are Henry Howland, J. E. Switzer, and D. L. Lamb of Parkland, G. W. Braden of Chandler and Frank George of Agra.

MORAVIA, Pa.—The Mt. Air Telephone Company of Mt. Air, Lawrence county, has been incorporated with a capital stock of $5,000. The directors of the company are as follows: E. W. Dungan, Mt. Air; W. L. Douglass, Enon Valley; James Kelso, Moravia; William Fulerton, Edinburg; S. D. Kyle, Moravia.

WALLA WALLA, Wash.—A new rural telephone company has been organized to be known as the Tumulum Mutual Telephone Company to operate a line between this city and the Tumulum district. F. J. Bodefelt is president of the company and J. H. McCoy secretary. The line will later be extended to Freewater, Oreg.

CLARKSVILLE, N. Y.—The Lake Valley Telephone Company has been incorporated to operate in the towns of New Scotland and Coeymans. The capital stock of the company is $300 and the directors are W. H. Van Natten, E. L. Mitchell, Arthur Osterhout, John Swart, New Scotland; A. C. Mosher, Fred Haines, Lester Robinson, Coeymans.

VETERA, Pa.—The Nicktown and Ebensburg Telephone Company has been incorporated with a capital stock of $5,000. The directors of the company are as follows: Port Davis, A. B. Kersch, Nathaniel Good, John C. Lymer, Harry Good, John Lute, Frank Long, Nicktown; R. S. Edwards, Vetera; Eli Jones, Evans Griffith, Ebensburg; Frank Kusch, Nicktown.

IDA GROVE, Ia.—The Ida County Farmers' Mutual Telephone Company has been organized and the following officers elected: President, A. C. Garner; secretary, Robert Todd; directors, Richard Williams of Grant, Arch Gilmore and S. Noll of Silver Creek, S. M. Tenney of Corwin, Wm. Kolb of Logan, L. Clouse, Ed Maritz, George Walsh, Wm. Forney.

FORT SMITH, Ark.—Articles of incorporation have been filed with the secretary of state by the Pan Long Distance Telephone Company of Fort Smith, showing a capital stock of $1,000,000, of which $12,750 has been paid in. The directors of the company are: W. A. Latham, Charles Sutter, A. E. Boqua, Jr., Ed Zelleken, A. E. Boqua, Sr., W. R. Abbott and W. Arthur Latham.

BENNET, Neb.—Articles of incorporation of the Farmers' Mutual Telephone Company have been filed in the office of the county clerk. The capital stock of the company is placed at $10,000 and the maximum indebtedness which may be contracted at any time, $6,665. The incorporators are William F. Torbitt, Evens M. Meyers, John T. Dobbs, Harry Honor, Everitt W. Randall.

LEEDS, N. D.—The North Prairie Telephone Company has been organized for the purpose of constructing a farmers' line. The following officers have been elected: President, P. O. Foster; vice-president, James Hall; secretary, Elling Tufte; treasurer, P. Jorgenson; trustees, Gilbert Tostenson, Gust Morestad and Knut Nestegard. Construction work will begin at once.

HENDLEY, Nebr.—The Spring Green Telephone Company has been incorporated to construct and operate Independent telephone lines in Hendley and the surrounding country. The capital stock is fixed at $4,800, of which $1,560 must be paid in cash. The incorporators of the company are W. T. McKinney, Albert Martin, B. E. Schellenbarger, C. H. Drier and J. H. McKinney.

OAKLAND CITY, Ind.—The Oakland City Telephone Company has been incorporated with a capital stock of $10,000, to establish and maintain telephone exchanges in Gibson county and elsewhere in the state. The incorporators are C. F. Stevens, V. W. S. Tripett, Princeton; Carl Chambers, Hazelton; R. S. Mason, Alvin Wilson, J. W. McGowan and J. M. Vendeveer, Oakland City.

FALLS CITY, Neb.—The Southeastern Nebraska Telephone Company has filed articles of incorporation and will construct, operate and maintain a telephone system. The capital stock is $100,000 in shares of one dollar each, one-half of which must be paid. The incorporators are J. H. Miles, W. S. Korner, Edwin H. Towle, P. B. Weaver, Amos E. Gantt, J. H. Morehead and G. W. Duerfeldt.

GARY, Minn.—The Gary Telephone Company has filed articles of incorporation with the register of deeds, with a capital stock of $5,000. The incorporators are Halvor Lee, D. C. Jones, Gregor Moe, N. J. Nereson, Anton Lanon, Trom Rishof and Andrew Engeset, and the officers as follows: President, Ole H. Sersland; vice-president, Andrew K. Rude; secretary, Halvor Lee; treasurer, N. J. Nereson.

INDIANAPOLIS, Ind.—The A. & G. Telephone Company, with a capital stock of $5,000, has filed articles of incorporation with the secretary of state. It is the purpose of the incorporation to operate telephone exchanges in Vanderburgh, Posey and Gibson counties. The officers of the company are: President, Cornelius Roeder; vice-president, Christ Goeble; secretary, Louis A. Haas; treasurer, Christ Strupp.

MINNEOTA, Minn.—The citizens of this place have organized a stock company and will install a local telephone system. The company will be incorporated with a capital stock of $5,000 and the city will be asked to grant a franchise. The officers of the company are: President, C. B. Bjorson; secretary, F. C. Murray; treasurer, H. J. Tillemans; directors, C. K. Melby, Dr. H. J. MacKechnie, W. H. Deen, H. B. Gislason. The farmers of Westerheim have also or-

ganized a company and will construct a line to connect with Minneota.

NEW ORLEANS, La.—The Tulane Telephone & Telegraph Company is the name of the new Independent telephone company seeking a franchise to install a telephone system in this city. The officers of the company are as follows: President, Z. W. Tinker; vice-president, Charles Sutter; secretary, T. L. Mason, Jr.; treasurer, George Tinker. Judge John Clegg has charge of the case as attorney.

LITTLE ROCK, Ark.—Articles of incorporation have been filed with the secretary of state by the City Power, Light and Water Company of Augusta, showing a capital stock of $50,000, with $31,000 subscribed. The company proposes to operate an electric and water plant and telephone system and eventually to construct an electric railroad line. The incorporators are J. A. Vinson, A. H. Tilman and Louis S. Vinson.

PANGUITCH, Utah—The Garfield County Telephone Company has been organized and has filed articles of incorporation. The company is capitalized at $20,000, $10 per share, with 350 shares subscribed. The following are the officers and directors for the coming year: President, M. M. Steele; vice-president, Thomas Levy; secretary, Dr. R. S. Thomas; treasurer, J. D. Spencer; James Showalter, S. O. Henrie, R. G. Clark.

BRANDON, Vt.—A new telephone company has been organized here under the name of the People's Telephone Company, which will take over all the telephone properties in Brandon and will operate them as a single system. The stock of the new company will have a value of $10 per share and it is expected that sufficient amount of the stock will be taken by the town's people, which will give them control of the corporation.

HALLOCK, Minn.—The Hallock Telephone Exchange will hereafter be known as the Kittson Telephone Company. The new organization was incorporated May 1 with the following officers: President, John Birkholtz; vice-president, R. A. Demars; secretary and treasurer, T. M. George. The company will at once begin the construction of three hundred miles of rural telephone lines, and by the time the lines are finished the company will have practically every farmer it can reach connected with the city exchange.

NEWCASTLE, Pa.—A new telephone company has been organized in this city to be known as the Newcastle Telephone & Electric Company, and will have a capital stock of $200,000, divided into 4,000 shares of a par value of $50 each. The following officers have been elected: President, William M. White; treasurer, J. Ed Duff; secretary, William T. Harrington; directors, George C. Battley, J. Ed Duff, Jesse J. Dean, Scott Paisley, William E. Patterson, William M. White and W. T. Harrington. A state charter will be secured at once.

TOPEKA, Kan.—The Independent Telephone Company has taken out a new charter for a capitalization of $1,000,000. No changes were made in the officers of the company, B. F. Pankey continuing as president and W. P. Hemphill, secretary. The purpose of the new charter is to allow the company the authority to increase its business and the scope of its operations. The Independent company is planning extensive improvements in Topeka and to eventually increase its toll lines and a new charter was necessary before this could be done.

LAWRENCE, Mass.—The Lawrence Independent Telephone Company has been organized at this place and the following officers elected: President, William C. Ford; vice-president, James S. Conlon; treasurer, Jeremiah J. Desmond; secretary, James E. Simpson. Many prominent citizens in this city are interested in the new company and already $90,000 has been subscribed for the purchase of the stock. Articles of incorporation have been prepared, and it is expected that the company's charter will be granted at once. Application has been made for a franchise to install a telephone exchange and if granted the company will be in readiness to install its system at once.

CYCLONE, Ind.—Articles of incorporation have been filed for the Cyclone Co-operative Telephone Company. The company is capitalized at $500 and the shares are $5 each. The territory occupied by the company is to be divided into nine districts and the board of directors is to consist of one member from each district. Among those interested are Albert Strong, William D. Holt, William G. Irons, Will S. Emley, James McIntire, Jacob B. Derrick, John W. Barrett, Edward Spray, Elijah M. Walker, James E. Irwin, I. G. Cook, L. G. Bolt, Jack Stephenson, J. W. McKinsey, Bruce Hutchinson, Amos T. Derrick, Manson Henry, O. M. Roush, C. W. Sims, R. B. Clark, W. A. Kissinger, A. A. Pauley, M. M. Smith

ELECTIONS AND MEETINGS

ELLIOTT, Ill.—The Dix Telephone Company recently held a meeting in this place and re-elected the old officers for the coming year.

ULYSSES, Neb.—At the annual meeting of the Ulysses Independent Telephone Company the following officers were elected: President, W. H. H. Starbuck; vice-president, D. A. Wynegar; secretary, E. Crosby.

ORD, Neb.—The Ord Telephone Company has elected the following directors: Peter Mortensen, W. W. Haskill, Guy Laverty, T. H. Wheeler.

AKELEY, Minn.—The Akeley Telephone Company, recently incorporated, has elected H. H. Thomas president and Bert Rodman secretary and treasurer.

WARWICK, N. Y.—The Warwick Valley Telephone Company has elected the following trustees: John W. Sanford, Fred C. Carey and George F. Ketchum.

ORWELL, Pa.—The Orwell Telephone Company has elected directors as follows: E. D. Chaffee, N. A. Chaffee, H. G. Newell, J. E. Eastman, and C. H. Allis.

BORDEN, Ind.—The Overland Telephone Company of this place has elected officers as follows: President, Elmo Cauble; secretary and treasurer, William Deitrich.

ALPENA, Mich.—The Alpena Mutual Benefit Telephone Company has elected officers as follows: President, C. H. Reynolds; secretary and treasurer, W. H. Johnson.

HUMBOLDT, Neb.—The Porter Mutual Telephone Company has elected the following officers: President, J. K. Cornelius; secretary, J. O. Shroyer; assistant secretary, Peter Gergens.

HARTLAND, Minn.—The Hartland Telephone Company has elected the following officers: General manager, W. W. Byers; treasurer, Andrew Jacobson; secretary, C. A. Stensrud.

CANDOR, N. Y.—The Candor Telephone Company has elected the following officers: President, C. P. Middaugh; vice-president, L. C. Burt; treasurer, H. D. Heath; secretary, E. D. Holly.

NELSON, Nebr.—The Nuckolls County Telephone Company has elected the following directors: J. C. Chamberlain, J. C. Day, J. R. Parsons, I. A. Wehrman, W. A. Voigt and S. A. Lapp.

MARION, N. D.—The La Moure County Telephone Company at its annual meeting elected A. W. Cunningham president. The company will build additional toll lines during the coming summer.

PRINCETON, Ill.—At a meeting of the board of directors of the Independent Telephone Company the following new directors were elected: H. G. Wells, P. P. Mikles, W. L. Isaac, J. B. Stetson.

AVOCA, Wis.—The Avoca & Muscoda Telephone Company has elected the following officers: President, J. J. Hinkle; vice-president, John Sikir; secretary, B. W. Gillett; treasurer, Homer Randall.

ANDERSON, Cal.—The Happy Valley Telephone Company has elected the following officers: President, M. A. Batson; vice-president, S. Hilton; secretary, L. D. Walker; treasurer, A. L. Walker.

AUBURN, Cal.—The Placer County Telephone Company has elected the following officers: President, John A. Livingston; vice-president, C. P. Huestis; secretary, G. Geraldson; treasurer, A. R. Hall.

CRIDER, Mo.—The Spring Creek Telephone Company has perfected a permanent organization by the election of the following officers: President, J. W. Bingham; secretary, Henry Garrett; treasurer, J. Dudley.

WAYNE, Mich.—The People's Telephone Company has elected the following officers: President, Joseph Waltz; vice-president, E. C. Maxwell; second vice-president, Jesse Butler; secretary and treasurer, F. L. Edwards.

SOMERS, Ia.—The Somers Mutual Telephone Company is constructing additional lines. The officers of the company are: John Mills, president; C. B. Gray, secretary; Burt Wilkinson, Phil Slagel and Chester Clark, directors.

MEDICINE HAT, Alberta, Can.—The Alberta Southeastern Telephone Company has elected the following officers: President, John Houston; vice-president, S. T. Fawcett; secretary-treasurer, W. C. Harris; auditor, H. W. Ireland.

NELSON, Minn.—The Nelson Telephone Company recently incorporated at this place has elected the following officers: President, John Nelson; vice-president, Charles Schelin; secretary, H. J. Ernster; treasurer, N. O. Johnson.

CATO, N. Y.—The Cato & Meridian Telephone Company has elected the following directors: G. B. Hapeman, John E. Casey, Eugene Soule, James Mehan, L. D. Stafford, J. E. Turner, John K. Rich, G. V. Applegate, Smith D. Ward.

FREEPORT, Ill.—At a meeting of the stockholders of the Freeport Telephone Exchange the following officers were elected: President, Dr. Mease; vice president, W. A. Hance; secretary and general manager, L. A. Herrick; treasurer, E. T. Moore.

SALEM, Ill.—The Woodlawn Telephone Company has elected the following officers: President, N. Howe; vice-president, Ora Bradley; secretary, Emmus Loefel; treasurer, Luther Howe; directors, A. L. Waring, Ora Bradley and Charles Swalley.

FALL RIVER, Mass.—The Fall River Automatic Telephone Company has elected the following directors: Edward B. Jennings, Edmund W. Wakelee, John T. Swift, P. A. Mathewson, Joseph

Waters, Martin Feeney, Bradford D. Davol, the latter being also clerk and treasurer.

NEW YORK, N. Y.—At the recent annual meeting of the New York and Eastern Telephone and Telegraph Company the following directors were elected: J. B. Conley, J. B. Cooney, George Fleming, James Fenwick, John F. Ince, S. H. Mildenberg, Wm. Shirden.

SOUTH BUTLER, N. Y.—The Butler Independent Rural Telephone Company, just incorporated, has elected the following directors: John B. Aikens, Lucius H. Viele, L. I. Douglas, Delos S. Chapin, J. W. Miller, A. J. Ackerman of Butler, and Cyrus Aikens of Savannah.

COUNCIL GROVE, Kan.—At a meeting of the promoters of the Council Grove Telephone Company, a permanent organization was effected by the election of the following directors: R. S. Davidson, A. R. Kinkel, James Sharp, J. W. White, W. J. Pirtle, G. W. Coffin.

BLOOMER, Wis.—The annual meeting of the Bloomer Telephone Company was recently held at this place and officers were elected as follows: President, Dr. J. A. Morrison; vice-president, Jacob Wirth; secretary, Jos. G. Pruher; treasurer, W. E. Kitch; director, Wm. Larson.

DUNFERMLINE, Ill.—The stockholders of the High Bridge Telephone Line held their annual meeting at this place and elected the following officers for the ensuing year: President, Thomas Ballard; vice-president, J. T. Graham; secretary and treasurer, J. Betts; trustee, Wallace Woodcock.

OWASCO, N. Y.—The West Lakeside Telephone Company has elected the following officers: President, Clark W. Gravitt; vice president, George B. Cuddeback; secretary and treasurer, Smith Odell; directors, George Hoyt, Calvin Loyster, W. E. Hatch, John I. Fisher, E. C. Chamberlain, and N. B. Ford.

NANTICOKE, N. Y.—The annual meeting of the Glen Aubrey and Whitney Points Telephone Company was held recently and the following officers elected: President, P. E. Sutpher; vice president, Charles Slack; secretary, William Borden; treasurer, Duane Barnes; directors, B. D. Cady, George Vandeburg, Carley Smith.

KERKHOVEN, Minn.—At the annual meeting of the Mamre & Pillsbury Telephone Company the following officers were elected for the following year: President, Louis Lofven; vice-president, G. Brobeag; secretary, Hjelmer Johnson; treasurer, J. Noland; directors, Joseph Holmgren, Theo. Johnson and J. A. Enander.

CASCADE, Mont.—The Cascade County Rural Telephone Company has elected the following officers: President, John Mainland; vice-president, Duncan Cameron; secretary-treasurer, W. F. Kester; directors, O. H. Parker, Duncan Cameron, J. W. Millegan, W. F. Kester, John Mainland, William Gemmill, H. B. Neville.

WEATHERFORD, Tex.—At a meeting of the directors of the Home Telephone Company recently held in this city the following officers were elected: President, W. D. Carter; secretary and general manager, R. Armstrong; treasurer, J. H. Casler. Mr. Casler is also president of the Independent Telephone Association of Texas.

BELOIT, Wis.—The Beloit Telephone Company held its annual meeting on the 9th inst. and elected the following officers for the ensuing year: President, N. J. Ward; vice president, W. H. Grinnell; secretary and manager, Alfred Slater; treasurer, W. M. Britton; additional directors, W. W. Lufkin and C. B. Salmon.

ORANGE, Tex.—The directors of the Orange Telephone Company recently elected the following officers: President, E. L. Bruce; vice-president, A. L. Ford; secretary and general manager, E. P. Weber; treasurer, W. D. Dean. The report showed that about 100 subscribers had been added to the list since October last, there now being 525 in service.

CLARKSBURG, W. Va.—The Sardis Telephone Company has elected the following directors: J. W. Gerrard, Silas Starke, Alexander Davisson, Marion T. Cunningham, Lloyd M. Hustead, John Robey, A. J. Michael, Michael Morris, A. W. Coffman; president, J. W. Gerrard. The company has over 100 miles of lines in operation and will make extensions.

PEORIA, Ill.—At the recent meeting of the Central Illinois Independent Telephone Association the following officers were elected: President, J. S. Daily, Chillicothe; vice-president, W. G. Olwin, Peoria; secretary-treasurer, H. W. Bullock. One hundred thousand telephones and some eleven hundred miles of toll lines were represented by those in attendance at the meeting.

WILLIAMSON, N. Y.—The Wayne-Monroe Telephone Company has elected the following officers: President, George F. Waters, of Pultneyville; vice-president, Ledyard S. Cuyler, of Lyons; secretary and treasurer, Judson L. Transue, of Williamson; executive committee, Dr. J. S. Brandt, of Ontario; George R. Miles of Wolcott and Albert Yeoman, of Walworth; temporary manager, John A. Driscoll.

GALION, O.—The annual meeting of the stockholders of the Galion Telephone Company was held in this city recently and the following officers elected for the ensuing year: President, Mark Cook; vice-president, A. A. Whitney; treasurer, J. W. Cupp; secretary, Sol M. Wolf; manager, C. R. Colley; directors, Mark Cook, Sol Wolf, A. A. Whitney, W. P. Vaughn, C. R. Callaghan and J. W. Cupp.

MIDDLEBURY, Vt.—At the annual meeting of the Rutland County Telephone and Telegraph Company, held in Middletown Springs, officers were elected as follows: President and general manager, A. W. Foote of Middlebury; vice president and treasurer, W. F. Grover; secretary, D. S. Carpenter of Middletown Springs; directors, J. E. Buxton, D. S. Carpenter, and S. B. Senders of Wallingford; W. F. Otis of Danby, A. W. Foote and W. E. Grover.

NEW ULM, Minn.—At the annual meeting of the stockholders of the New Ulm Rural Telephone Company the following officers were elected: President, Philip Liesch; vice-president, Alex Russell; secretary, F. H. Krook; treasurer, Otto Schell; directors, Aug. Hummel, Philip Liesch, Otto Schell, F. H. Retzlaff, A. J. Vogel, Jos. A. Eckstein, M. Schnobrich, Jos. Wiesner, A. Wagner, Milford Herman, P. Rolloff, Fritz Rolloff, John A. Sellner, Wm. James, Fred Wellner, Wm. Wellner, Jr., C. H. Braun, Alex Russell and Leon Vetter.

BARBERTON, O.—The Barberton Telephone Company, recently incorporated, has perfected its organization by the election of the following directors: A. R. Henry, James McNamara, C. Weigand, George Shaw, and Tim O'Toole, all of Barberton; E. A. Read of Columbus and F. G. McConnell of Akron. A meeting of the directors was held, at which time officers were elected and plans outlined. The new company takes over the property of the Central Union Telephone Company at Barberton, which will be thoroughly overhauled and extended.

MUNCIE, Ind.—Representatives from all over the fifth district of the Indiana Independent Telephone Association recently held their annual meeting in this city. The following officers were elected for the ensuing year: President, J. A. Browne, of Winchester; secretary-treasurer, S. O. Miller, of Fairmount; delegates to state convention, A. L. Johnson, Thomas Bromley, Jr., of Muncie; O. H. Barnhill, of Winchester; H. O. Miller, of Fairmount; J. A. Browne, Winchester; F. D. Russling, of Daleville; O. L. Barger, of Converse; D. Mount, of Tipton; Frank White, of Portland.

BARABOO Wis.—An enthusiastic meeting of the stockholders of the Farmers' Mutual Telephone Company was held in this place recently to perfect an organization and make plans for the future. The following officers were elected: President, Robert Attridge; vice president, E. R. Thomas; secretary, L. H. Palmer; treasurer, O. A. Getchell; directors, Robert Attridge, O. A. Getchell, L. H. Palmer, W. S. Halstead, E. R. Thomas, S. Cobleigh, Theodore Kramer, Edmund Calvert. Over $300 was paid in at the meeting and over 100 patrons have been pledged. The shares are $30 each, and according to the laws of the state one-fourth of the capital stock, $6,000, must be paid in before the company can begin.

SHORTSVILLE, N. Y.—At the annual meeting of the Red Jacket Telephone Company, held recently, the following officers were elected for the ensuing year: President and general manager, Carlos P. Osgood, of Manchester; vice-president, Robert R. Peck, of Shortsville; secretary, Willis C. Ellis, Shortsville; treasurer, Oliver S. Titus, Shortsville; directors, Willis C. Ellis, Robert B. Peck, Oliver S. Titus, Mrs. Daisy Osgood, Carlos P. Osgood, Dr. John H. Pratt, W. H. Burke. The annual reports of the secretary showed the company to be in a flourishing condition, and were gratifying in every particular. During the past year the company has more than doubled its list of subscribers and is now extending its lines through the country.

WACO, Tex.—At the recent convention of the Independent Telephone Association, held in this city, the following officers were elected for the coming year: President, J. C. Casler, of Ft. Worth; secretary and treasurer, C. A. Shock, of Sherman; first vice-president, C. W. Roberts, of Abilene; second vice-president, C. A. Wilson, of Granger; third vice-president, Thomas O'Rourke, of Shreveport. J. P. Earl was chosen as delegate to the national convention. The Telephone Clearing House Association was formed, composed of the South Texas Telephone Company, Brazos Valley Telephone Company, Texas Telephone Company, North Texas Telephone Company, Ellis County Independent Telephone Company, Texas Consolidated Long Distance Telephone Company, Fort Worth Long Distance Telephone Company and the Granger Telephone Company. J. B. Earle was elected auditor of the new organization.

ORDINANCES AND FRANCHISES

SPRINGFIELD, Mo.—The Home Telephone Company has applied for a franchise in this city.

LANGDALE, Ala.—The Langdale Telephone Company has applied for a charter to extend its lines.

CAMAS, Wash.—The Fern Prairie and Camas Telephone Company has been granted a franchise.

BARRE, Vt.—The Orange County Telephone Company has applied for a franchise in this place.

SHELBYVILLE, Ind.—The city council has granted a franchise to

the New Long Distance Telephone Company to establish an exchange in this city.

MARYSVILLE, Cal.—Frank W. Anderson of Wheatland has applied for a fifty years' franchise in this city.

COLUMBUS GROVE, O.—The Farmers' Mutual Telephone Company has applied for a franchise in this city.

HASTINGS, N. Y.—The Independent Telephone Company of Syracuse has applied for a franchise in Hastings.

ELKTON, Ky.—The city council has ratified the sale of the Todd County Home Telephone Company franchise.

HECLA, S. D.—The Dakota Central Telephone Company of Aberdeen has been granted a franchise in Hecla.

LEYDEN, Mass.—The Heath Telephone Company, with headquarters at Heath, has been granted a franchise in Leyden.

SPRINGFIELD, Mo.—The Springfield Home Telephone Company recently incorporated, has applied for a franchise in this city.

HOLDREDGE, Nebr.—The city council has granted a twenty-year franchise to the Huntley and Mill Creek Telephone Company.

SKAGWAY, Alaska.—The Alaska General Electric Company has secured a franchise to maintain a telephone system in this place.

LIBERTY, Mo.—The Clay County Telephone Company is seeking a franchise to install and operate a telephone system in this place.

COBLESKILL, N. Y.—Application for telephone franchise has been received from Dr. F. P. Beard and one from Howard Hendrickson of Albany.

FORT LAUDERDALE, Fla.—M. A. Marshall of this place has been granted a franchise to construct a telephone line from Fort Lauderdale to Dania.

RUSSIAVILLE, Ind.—Messrs. Evans & Jeter of this place have applied for a franchise to construct a telephone system in Honey Creek township.

WARE, Mass.—The Citizens' Telephone Company of Northampton will present a petition for a franchise in this city with a view to installing an exchange.

MARSEILLES, Ill.—A franchise has been granted to the Marseilles Telephone Company in this city. The company will make many improvements in its system.

MONROE, Ind.—A telephone franchise covering portions of Monroe, Blue Creek, French, Kirkland, St. Marys, and Washington townships has been granted to Dr. M. F. Parrish of Monroe.

HAMMONDSPORT, N. Y.—The Hammondsport Telephone Company has been granted a fifty-year franchise by the trustees. A large number of subscribers to the system have already been secured.

MT. UNION, Ia.—A special election has been called for the purpose of granting to the Henry County Telephone Company a franchise for the erection and maintenance of a telephone system for twenty years.

SHELBYVILLE, Ind.—A franchise has been granted the New Long Distance Telephone Company to bring its lines into the city to a switchboard connecting several Independent telephone companies of Shelby county.

CHARLOTTETOWN, P. E. I.—The franchise of the Prince Edward Island Telephone Company has been extended ten years. The company contemplates the expenditure of $20,000 in the improvement of its plant.

TRIADELPHIA, W. Va.—The National Telephone Company of Wheeling, has filed with the clerk of town council application for a franchise to construct and operate a telephone system in Triadelphia for a period of fifty years.

FRANKLIN, Tenn.—The board of aldermen granted a franchise to the Home Telephone Company of Nashville. Preparations have been made by the Home company for installing a telephone system here, and work will begin at once.

TORONTO, Ont.—The Independent Long Distance Telephone Company has been granted a franchise to install and operate long distance telephones in Ontario, providing the company shall expend $200,000 in construction work within the next two years.

PAWTUCKET, R. I.—The Home Telephone Company, formerly the New England Shaver Telephone Company, has petitioned for a franchise in this city. The company has been granted a franchise by the Cumberland town council. The headquarters of the company is Providence.

WATERTOWN, S. D.—At a meeting of the city council a new franchise was granted to the Dakota Central Telephone Company. The franchise provides that the company shall construct and maintain an underground system throughout the business portion of the city. The company also obtained permit to construct a telephone exchange building.

COURTLAND, Ala.—The Morgan County Telephone Company with headquarters at New Decatur, has made application to the board of aldermen of this place for a franchise for local and long distance telephone service. Besides exchanges in New Decatur and Birmingham this company has exchanges in many of the small towns of northern Alabama and a long distance line between the cities mentioned. It is said to be the intention of the company to build to Memphis in the near future and from that point extending down the Mississippi river.

NEW YORK, N. Y.—Owing to a recent ruling of Corporation Counsel Delany, the Great Eastern Telephone Company will be compelled to secure a new franchise before it can install a system in this city as the franchise granted to the Electric Lines Company and under which the Great Eastern Company proposed to operate, has been declared void.

HILLSBORO, Tex.—At a recent meeting of the city council which was held to confer with the committee of citizens appointed to ask a reconsideration of the telephone franchise recently granted to the Independent telephone company and rejected because of the fixing of the maximum rate at $2.50 for business and $1.50 for residence, a compromise was effected, the rental rate being fixed at $2.50 for business and $2.00 for residence telephones. The franchise thus amended was accepted by the company.

SAN FRANCISCO, Cal.—The Home Telephone Company has bid $25,000 for the telephone franchise which has been advertised for the required ninety days. When the supervisors hesitated to accept the offer, Attorney North, acting for the company, stated that there are three certified checks for $25,000 each, a total of $75,000, which the company is ready to donate to the relief of the people of the city. It was stated that the company considered the franchise of more value than $25,000, but as the actual coin had to accompany the bid, at the present time they were unable to offer more owing to the scarcity of coin. A motion to accept the bid was carried and the franchise granted.

NEW CONSTRUCTION

CHAMBERS, Ky.—The Chambers Telephone Company will build a new line.

ATLANTA, Ga.—The Atlanta Telephone Company will build a new exchange.

OAK GROVE, Ala.—The Oak Grove Telephone Company will build a number of branch lines.

ROCK HILL, S. C.—The Rock Hill Telephone Company will establish a telephone exchange here.

COLUMBUS, O.—The Citizens' Telephone Company will install an exchange at Linden Heights.

WHITENER, Ark.—The Rural Co-operative Telephone Company will construct 226 miles of new line.

FOUNTAIN, Minn.—John O. Solie will install a local telephone exchange, work to begin in the near future.

PALMYRA, Mo.—The Electric Flash Telephone Company will construct a line from Palmyra to La Grange.

RINGGOLD, La.—S. J. Crump of Athens, La., contemplates the establishment of a telephone exchange at this place.

JOPLIN, Mo.—Plans have been prepared for the erection of a new exchange building by the Home Telephone Company of this city.

HILTON, N. Y.—The Hilton Telephone Company will construct additional lines and will also install new exchange apparatus in this place.

ODEBOLT, Ia.—The New State Telephone Company will install a copper line from Correctionville to Carroll via Ida Grove and Odebolt.

GRANT'S PASS, Ore.—Farmers of Applegate Valley will construct an Independent telephone line connecting with Grant's Pass during the summer.

NEWAYGO, Mich.—The Citizens' Telephone Company exchange at this place will be rebuilt and the entire plant will be changed to a metallic system.

BALD KNOB, Ark.—The Bald Knob Telephone Company is building a metallic line to Russellville, where an exchange will be established in the near future.

VIRGINIA, Ill.—The Cass County Telephone Company will install a new suburban line extending from Chandlerville. The company now has sixty suburban lines.

RUSSIAVILLE, Ind.—The Russiaville Telephone Company will build a trunk line into Kokomo within a short time which will connect with the Kokomo Independent line.

FORT WILLIAM, Ont.—The Fort William Town Council has decided to construct a building for its telephone lines. The operating room will have a capacity for about 5,000 lines.

MILWAUKEE, Wis.—The Telephone & Telegraph Service Company contemplates the construction of about 400 miles of toll lines in the near future, covering a large part of the state.

GAYLORD, Kan.—The Gaylord Telephone Company contemplates

the construction of additional lines extending in all directions from this place. The company now has 300 telephones in service.

CLARKSVILLE, Tenn.—The Clarksville Home Telephone Company is rebuilding its lines from Clarksville to Memphis. The company will rebuild its system at Erin, and will install a new switchboard.

LANSING, Mich.—The Michigan state board of agriculture will install an automatic telephone system at the Agricultural College, which will connect with the Independent telephone system in this city.

MT. UNION, Ia.—B. B. Lindley, D. Glass, Ed Huston and J. A. Baxter of Winfield, contemplate the installation of a telephone exchange in this place with lines connecting Mt. Union, Winfield and Yarmouth.

LOGANSPORT, Ind.—The Logansport Home Telephone Company is negotiating for the installation of a telephone exchange in the town of New Waverly. If sufficient encouragement is given the work of installation will begin at once.

ELLENDALE, Minn.—Citizens of Ellendale are considering the installation of a local telephone exchange. L. F. Burnes, F. R. Randall, and George Stearns have been appointed as a committee to canvass the field with this end in view.

WEISER, Idaho—The Idaho Independent Telephone Company of Boise will install a telephone system at this place at an estimated cost of $10,000. A franchise has been granted at Emmett, at which place a similar system will be installed.

FLORENCE, ARIZ.—The Lake Superior and Arizona Copper Company is preparing to construct a telephone line between Florence and Superior. Bids on the work have been submitted and construction work will probably begin in the near future.

WABASH, Ind.—The Home Telephone Company of this city has ordered plans and will soon ask for bids for the construction of a new and modern exchange building. The company is also in the market for a new central-energy multiple switchboard.

GREEN BUSH, Minn.—Mr. H. Fant, proprietor of the Thief River Telephone Exchange, will soon begin the construction of a telephone exchange in this place. He has purchased the Sjoberg line from Badger to Roseau and will operate toll service between this place and Badger.

DUBLIN, Tex.—Citizens of this place are preparing to establish an exchange in Dublin for the rural telephone lines throughout this section and Erath county. The idea is to erect a line from this place to the various rural exchanges near Dublin, connecting those exchanges that are not already connected.

NORWAY, Ia.—An Independent telephone line will be constructed to be known as the Norway-Eagle Grove line, which will connect the farmers in Norway and Newark. The following officers have been elected: President, Ole B. Jondahl; vice-president, M. Gunderson; treasurer, Edward Hauson. The work of building the new line will begin at once.

COLLEGE STATION, Tex.—Dr. N. H. Brown of the department of electrical engineering has on foot a plan for installing a local telephone exchange on the college campus. Dr. Brown is making a canvass to ascertain if the demands for such service would be sufficient to justify the outlay. If so, a joint company will be formed and the system installed. The cost of the system is estimated at $2,000 to $2,500.

TOPEKA, Kans.—The Independent Telephone Company has purchased a site and will erect thereon a $25,000 telephone exchange and office building. A new switchboard of the most modern type will be installed, which will accommodate between nine and ten thousand subscribers on independent lines, and its capacity will be 15,000 subscribers if party lines are used. The cost of the new board alone will be $75,000 when completed.

DIXON, Ill.—Owing to the rapid growth of the Home Telephone Company it has been necessary to increase its switchboard capacity. The company now has over one thousand telephones in service, with orders on its waiting list. Contracts have been signed for another new line in Palmyra and a new line will be built to Grand Detour, besides other short lines. The company has had an increase of over 60 per cent during the past year.

EXTENSIONS AND IMPROVEMENTS

TESCOTT, Kans.—The Tescott Telephone Company will extend its line.

ARCO, Minn.—The Arco Telephone Company will build additional lines.

HARTLAND, Minn.—The Hartland Telephone Company will build a new line.

LERDAL, Minn.—The Lerdal Telephone Company contemplates many changes in its system.

BRAZIL, Ind.—The Citizens' Telephone Company has decided to expend $15,000 in improving and enlarging its plant, which will include additional cable and switchboard capacity. John Klingler is president of the company. The company has 2,500 telephones in service.

MORRILL, Minn.—The Morrill Telephone Company will extend its lines in several directions.

PINGREE, N. D.—The Pingree Telephone Company is making arrangements to extend its lines.

HARTFORD, Ia.—The Hawkeye Telephone Company will extend a line from Hartford to Carlisle.

FT. WORTH, Tex.—The Ft. Worth Telephone Company will expend $150,000 in improving its plant.

BEATRICE, Neb.—The New Home Telephone Company contemplates many improvements in its system.

STATE LINE, Mass.—The Farmers' Telephone Company of this place will extend its line to Housatonic.

OSGOOD, Ind.—The Osgood Telephone Company contemplates making many improvements in its system.

MORNING SUN, O.—The Morning Sun Telephone Company contemplates enlarging the capacity of its system.

HEBRON, Me.—The Hebron Home Teelphone Company is making arrangements to extend its lines and improve its system.

LLANO, Tex.—The Martin Telephone Company of this place is putting in an exchange at Blanco and will extend a line to Kendalia.

YERINGGTON, Nev.—The Independent Telephone Company will make extensions to Smith Valley, Gardnerville, Aurora and other points.

REMBRANDT, Ia.—The Northern Telephone Company, with headquarters at Fonda will extend a line to this place and establish an exchange here.

SASKATOON, Sask., Can.—The Saskatchewan & Electrical Supply Company will increase its switchboard capacity and otherwise improve its system.

DULUTH, Minn.—The Zenith Telephone Company of this city contemplates the expenditure of $75,000 in the improvement of its plant this season.

CANTON, S. D.—The Canton Co-operative Telephone Company will make many improvements in its system and will also construct a line to Klondike, Ia.

NEW ULM, Minn.—The New Ulm Rural Telephone Company will build additional lines and will also enlarge its switchboard to a capacity of nearly one thousand.

GREENFIELD, Tenn.—The Greenfield telephone system will be remodeled. The improvements will include the installation of two switchboards, 500 poles and 25,000 feet of cable will be used.

ARLINGTON, Neb.—The Arlington Telephone Company expects to build several new lines during the summer. This is one of the largest Independent companieis in the state and connects with all the important towns and cities.

LORAIN, O.—At a recent meeting of the directors of the Black River Telephone Company it was decided to expend between $15,000 and $25,000 in the improvement of the local plant and extensions. Additional cables will be strung and the switchboard capacity will be increased.

BANGOR, Wis.—The stockholders of the Bangor Telephone Company recently held their annual meeting. Reports showed a very prosperous year. The company has 400 telephones in service, an increase of 100 during the past year. Several extensions are contemplated for the present year.

COLUMBIA CITY, Ind.—Arrangements have been made by the Whitley County Farmers' Mutual Telephone Company, through its special representative, Robert R. Scott, to extend its lines into Jefferson township and to Roanoke, at which place the lines will connect with the lines of the Uniondale Company.

COMFORT, Tex.—The Eureka Telephone Company, of San Antonio, is making arrangements for the extensions of its service in this vicinity. This company now owns about 800 miles of line, both metallic circuit and ground lines, and has 16 exchanges in the various towns of southwest Texas, and its service is being constantly extended.

MT. VERNON, O.—The annual meeting of the stockholders of the Mt. Vernon Telephone Company was held in this city recently. The officers of the company are as follows: President, Frank L. Beam; secretary, Harry C. Devin; treasurer, P. S. Kelser; directors, Frank L. Beam, W. P. Bogardus, Harry C. Devin, P. S. Kelser, B. D. Herron, R. G. McClelland, E. O. Arnold.

MASON CITY, Ia.—Two hundred thousand dollars will be spent this season in improvements by the Western Electric Telephone Company, with headquarters at this place. All the lines will be rebuilt, with copper and iron wiring, new poles and new switchboards, which will accommodate an increase in service. Several new lines will be built by the company, and these will be constructed of up to date material in every way. The new lines will extend between Fenton and Burt, Spirit Lake and Jackson, Minn., Rock

Rapids and Estherville, Albert Lea via Lake Mills and Forest City to Britt. New equipment will be installed in the office at this place, which will increase the service.

DILLON, Mont.—The board of directors of the Southern Montana Telephone Company recently held a meeting to consider the matter of further improvements on its lines. The business of the company has increased so rapidly that the board decided it advisable to make some extensions and also to repair the old lines. It is probable that before many months the entire system will be changed to a metallic circuit.

WILLMAR, Minn.—The Willmar Telephone Exchange Company will expend over $11,000 the coming season in the way of improvements to its plant. The entire system of wiring will be rebuilt and a new copper metallic system installed. Twenty-three thousand feet of cable will be put in, which will do away with the large number of overhead wires that are now strung along the street. Another switchboard will be added, increasing the capacity to over 700.

STEUBENVILLE, O.—It is stated that the National Telephone Company, which purchased the Phœnix telephone lines in this place and vicinity, proposes to spend nearly $100,000 in building up and improving the system. The company will install entirely new systems in Toronto and New Cumberland and will extend into rural sections never before entered, while the rural lines now controlled by the company will be thoroughly overhauled. The headquarters of the company is Wheeling, W. Va.

PORTSMOUTH, O.—Manager Knox of the Home Telephone Company announces that his company will, within the next few months, expend $80,000 in the improvement of the local system, which will mean a complete overhauling of the entire system. These improvements will include a new switchboard, new instruments, new cable, etc. While the capital stock of the company will not be increased, more local people have been interested in the company and the stock will be put on a stronger basis and be fully paid up. Manager Knox will have direct supervision of the many changes.

UNDERGROUND CONSTRUCTION

HATTIESBURG, Miss.—The telephone syndicate, of which L. C. Leek is local manager, will place its wires underground in Hattiesburg.

WEATHERFORD, Tex.—At a recent meeting of the Home Telephone Company directorate, plans for an underground system were presented and adopted. Work will begin as soon as material can be received. Also in addition to the underground system a new central energy plant will be installed.

FINANCIAL NOTES

CLEVELAND, O.—The Cuyahoga Telephone Company has declared a 4 per cent dividend.

JUNCTION, Ark.—The local telephone company has increased its capital stock to $25,000.

AUSTIN, Tex.—The South Texas Telephone Company has issued $150,000 of 5 per cent gold bonds.

WARREN, N. H.—The Baker's River Telephone Company has increased its capital stock to $5,000.

WILMOT, O.—The Valley Telephone Company has increased its capital stock from $1,000 to $5,000.

HILTON, N. Y.—The Hilton Telephone Company has increased its capital stock from $8,000 to $15,000.

WHEELING, W. Va.—The National Telephone Company has declared its third annual dividend of 6 per cent.

CLIFFORD, N. D.—The Traill County Telephone Company will increase its capital stock from $30,000 to $50,000.

SOUTH BEND, Ind.—The South Bend Telephone Company has declared a semi-annual dividend of 1 per cent.

ADAMSVILLE, O.—The Adamsville Telephone Company has increased its capital stock from $3,000 to $10,000.

RUSH CREEK, O.—The Rush Creek Telephone Company has increased its capital stock from $5,000 to $10,000.

JUNCTION CITY, O.—The Rush Creek Telephone Company has increased its capital stock from $5,000 to $10,000.

ROUND KNOB, Ill.—The Massac County Telephone Company has increased its capital stock from $2,490 to $4,980.

ULYSSES, Neb.—The Ulysses Independent Telephone Company has declared a dividend of 12 per cent for the year.

RISING SUN, Md.—The Cecil Farmers' Telephone Company has increased its capital stock from $30,000 to $60,000.

GRAND FORKS, N. D.—The Traill County Telephone Company will increase its capital stock from $30,000 to $50,000.

UNION GROVE, Wis.—The Union Grove and Parit Telephone Company has filed an amendment changing its name to the Union Grove Telephone Company and increasing its capital stock from $2,000 to $5,000; John S. Blakely president and William J. Callander secretary.

GRAND RAPIDS, Mich.—The Citizens' Telephone Company has declared its regular quarterly dividend of 2 per cent.

FALL RIVER, Mass.—The Fall River Automatic Telephone Company has declared its quarterly dividend of 1 per cent.

NEW ULM, Minn.—The New Ulm Rural Telephone Company will declare a 6 per cent dividend on its first year's business.

CHESTER HILL, O.—The People's Telephone Company of this place has increased its capital stock from $15,000 to $20,000.

RIVER STYX, O.—The Medina County Farmers' Telephone Company has increased its capital stock from $12,500 to $25,000.

MONROE CITY, Mo.—The Farmers' & Merchants' Telephone Company contemplates increasing its capital stock from $3,000 to $6,000.

WESTERLY, R. I.—The board of directors of the Westerly Automatic Telephone Company has voted to issue $20,000 capital stock.

WILLIAMSBURG, Mass.—The Williamsburg Independent Telephone Company will increase its capital stock from $50,000 to $100,000.

SALT LAKE CITY, Utah.—The Utah Independent Telephone Company has declared its second dividend of 1 per cent on its $1,000,000 capital stock.

BELOIT, Wis.—The Beloit Telephone Company has had a very successful year and has declared a dividend of 5 per cent on the capital stock.

FLANAGAN, Ill.—The Flanagan Telephone Company will increase its capital stock and will establish better service between Pontiac and Minonk.

KILBOURN, Wis.—The Farmers' Intercounty Mutual Telephone Company has filed an amendment increasing its capital stock from $5,000 to $10,000.

ELKTON, Ky.—At a meeting of the stockholders of the Todd County Home Telephone Company the capital stock was increased from $12,000 to $35,000.

CANAL FULTON, O.—The Canal Fulton Telephone Company has been incorporated with a capital stock of $10,000 by R. F. Meyers, W. E. Scoville and others.

OXFORD, Miss.—The Oxford Telephone Company reports that its total receipts for the last quarter were $1,228.51; expenses, $709.25, and the net earnings, $519.26.

AURORA, Ill.—A meeting of the directors of the Interstate Telephone and Telegraph Company was held in this city recently and the quarterly dividend on stock was declared.

HAMILTON, O.—The Hamilton Home Telephone Company has just declared its eleventh annual dividend. This company has gained 1,000 patrons within the past year.

PERRYVILLE, Mo.—The Perry County Telephone Company has increased its capital stock from $3,100 to $15,000. It is the purpose of the company to make extensions of its system.

STANTONVILLE, Tenn.—The Stantonville Telephone Company has increased its capital stock from $10,000 to $50,000. It is the company's desire to extend its business all over the state.

MINNEAPOLIS, Minn.—The directors of the Twin City Telephone Company have declared the seventeenth quarterly dividend at the rate of 7 per cent per annum on the preferred capital stock of said company.

PHILADELPHIA, Pa.—The Keystone Telephone Company's reports for March show gross earnings to be $69,730; net, $22,360; surplus, $5,452. For nine months: Gross earnings, $604,772; net, $271,849; surplus, $60,601.

CAPRON, Ill.—At a recent meeting of the stockholders of the Capron Home Telephone Company it was decided to increase the capital stock of the company to $10,000. A central office will be installed at this place, work to begin in the near future.

SHERMAN, N. Y.—The Sherman Telephone Company will declare a five per cent dividend. Hereafter the percentage will be reduced in order to provide a reserve fund to meet emergencies and for reconstruction purposes. The local system now has about 400 subscribers.

FORT WAYNE, Ind.—The directors of the Home Telephone Company have paid a semi-annual dividend of 1½ per cent. One of the extensions to be made by this company will be a direct line to Indianapolis to take care of the large volume of business now refused because of the inadequate service.

GASTONIA, N. C.—The Piedmont Telephone Company has amended its charter increasing its capital stock to $200,000, and has issued considerable new stock in making improvements. The company has inaugurated a plan to increase the use of the telephone in rural sections by offering telephones at 50 cents per month on party lines.

CHAMPAIGN, Ill.—The Home Telephone Company has filed for record in the county recorder's office, a certificate of increase in its capital stock from $25,000 to $100,000. It is understood the money

raised by the increase in stock will be used in the rebuilding of the Champaign and Urbana lines and in placing the system in first-class condition.

CLINTON, Mo.—The stockholders of the Mutual United Telephone Company of this city will hold a meeting on July 11 for the purpose of voting on a proposition to increase the capital stock from $15,000 to $100,000 and to issue bonds of said company in such amount as the stockholders may authorize. Wm. F. Hall, president; Geo. R. Lingle, secretary.

SLEEPY EYE, Minn.—At the annual meeting of the directors of the Sleepy Eye Telephone Company a dividend of six per cent was declared and the sum of $100 was placed in the sinking fund. Reports showed the company to be in a very prosperous condition. The company will soon begin the construction of forty miles more of rural lines, and when completed almost the surrounding country will have service.

SPARTA, Tenn.—At a meeting of the stockholders of the Gainesboro Telephone Company recently held in this city, it was decided to issue $100,000 in bonds. This is necessary to develop the new territory and put in metallic circuits. The manager's and auditor's reports were highly satisfactory, showing a material increase over the previous year. Joel H. Anderson was elected general manager to succeed J. N. Cox, resigned.

FT. WAYNE, Ind.—A call has been issued for a meeting of the stockholders of the Home Telephone & Telegraph Company, for the purpose of authorizing an increase in the capital stock of $350,000. The increase will bring the stock up to $600,000 and the new issues will be preferred stock to bear 6 per cent interest. The new stock will be used to pay for the National Telephone & Telegraph Company, which was recently purchased by the Home company, and to largely extend the company's toll lines in northern Indiana.

MT. VERNON, O.—At the annual meeting of the Mt. Vernon Telephone Company reports showed the company to be in a very satisfactory condition. There was a gain of 733 subscribers during the year. Amount of money received during the year from all sources, $70,996.15; expended for construction, $34,049.18; total assets of the company, $191,006.22. Since April 1, 1905, the company has earned $29,384.47, and this amount has been invested in property so that the company has not been compelled to pay out money received from the sale of stock.

SAN FRANCISCO, Cal.—The Home Telephone Company of this city has presented a bond of $250,000 as a guarantee of good faith that it will spend $4,000,000 on its system, for which it recently secured a franchise, $2,000,000 within the next year and $2,000,000 during the year following. The granting of the franchise is the last link in the chain of Independent telephone companies from Seattle to San Diego. The company will be under the management of A. K. Detwiler, who will be assisted by W. J. G. Lambert of the Riverside Home Telephone Company.

ROCHESTER, N. Y.—The annual report of the United States Telephone Company, just issued, shows that the company holds the controlling interest in eight large companies, one of them being the Independent Telephone Securities Company, which controls thirteen smaller telephone companies, including the Utica company. The cost of acquiring these companies is given at $56,459,343.43. The stock liabilities are $43,000,000 and the current liabilities are given as $1,833,000. The combined income for the past year is given as $4,155,505.40, and the operating and general expenses as $3,102,907.96, giving net earnings of $1,052,597.44.

FT. WAYNE, Ind.—The Home Telephone and Telegraph Company of this city has filed with the secretary of state a notice of increase of capital stock from $250,000 to $600,000, the new issue of $350,000 being cumulative preferred stock, which will bear 6 per cent interest. The company has decided to extend its field of operation to cover the following counties: Miami, Cass, Noble, Whitley, Huntington, Allen, Lagrange, Wells, Adams, St. Joseph, Steuben, Marshall, Kosciusko, Fulton, Henry, Marion, Grant, Blackford, Jay, Tipton, Madison, Delaware, Randolph, Pulaski, and Dekalb. It is the purpose of the company to cover the section of country covered by the United Telephone Company, recently taken over by the Bell company.

NEW PHILADELPHIA, O.—The Tuscarawas County Telephone Company has increased its capital stock from $200,000 to $350,000. The entire plant throughout the county is being reconstructed, over 60,000 feet of cable having been installed. The exchanges at New Philadelphia, Canal Dover, Uhrichsville and Dennison are installing new central-energy switchboards for the purpose of increasing the rates and installing party lines. When completed this will be one of the best telephone systems in the state. This company has been unable to take care of its increase in business and expects to install 1,000 telephones within the next year. The company has a good system of toll lines connecting with other Independent exchanges. At present there are over 3,000 telephones in service.

PERSONAL MENTION

CHASE, Kan.—L. W. Moore has been appointed manager of the Chase Telephone Company.

STEWART, Minn.—George Schmidt has been appointed manager of the local telephone system.

MONROE, Ia.—D. C. Phillips has been appointed manager of the Monroe Telephone Company.

TYLER, Tex.—F. B. Clyde has been appointed manager of the Independent Telephone Company's system at this place.

NEW LONDON, Wis.—O. A. Rice has been appointed manager of the Interurban Telephone Company's plant at this place.

TOPEKA, Kans.—Theodore Gary of Macon, Mo., has acquired an interest in the Independent Telephone Company of Topeka.

MUNCIE, Ind.—Will Harmon has been elected general manager of the Delaware and Madison Counties Telephone Company.

ANAMOSA, Ia.—A. W. Carroll, manager of the Jones County Telephone Company has resigned his position with the company.

DANVILLE, Ill.—H. E. Giltner has been appointed manager of the Vermillion County Telephone Company's exchange at this place.

ST. ALBANS, Vt.—John H. Gowdy of Burlington has been appointed manager of the Franklin Telephone Company, with headquarters in St. Albans.

AUBURN, Ind.—Capt. J. R. McDowell, for the past five years manager of the Home telephone exchange at this place, has resigned his position with the company.

ANAMOSA, Ia.—R. C. Allen, formerly with the Mississippi Valley Telephone Company, has been appointed manager of the Jones County Telephone Company at this place.

TACOMA, Wash.—The Puget Sound Telephone Construction Company of Los Angeles has filed notice of the appointment of Roscoe Howard of this city as agent in this state.

OLATHE, Kans.—Mr. M. G. Miller has assumed the management of the Citizens' Telephone Company at this place, and the system is being thoroughly overhauled and made first class in every respect.

SALEM, O.—W. S. Holloway, manager of the Columbiana County Telephone Company in the northern portion of the county, has resigned his position with the company. Mr. Holloway intends to go into business for himself, and has practically closed a deal taking over two exchanges located in the southern part of Ohio and in West Virginia.

DAVENPORT, Ia.—H. H. Bratt, who has for the past two years been superintendent of the lines of the Union Electric Telephone & Telegraph Company in this city, has been appointed general superintendent of all the company's lines, with headquarters in this city. Mr. Bratt will have entire charge and direction of all construction, maintenance, repairs, installation, etc., of all the company's plants.

SALT LAKE CITY, Utah.—Elmer B. Jones, managing director and counsel of the Utah Independent Telephone Company, will also be managing director of the Montana Independent Telephone Company, recently incorporated in Montana with a capitalization of $1,500,000, to cover the entire state. The company will be an ally of the Utah Independent Telephone Company. Lines will be built to Butte, Helena, Great Falls, and Anaconda during the summer, permission to build to Butte and Anaconda having already been obtained.

KENT, O.—W. H. Butler, who has been manager of the Portage County Telephone Company since its incorporation in March, 1903, has resigned his position, to take effect at once. Butler came to Kent in 1895, and so great was his faith in the telephone business that he built the Kent plant as a private investment. In June, 1900, the demands for service from all sides made it necessary to move into larger quarters, and the Kent Home Telephone Company was incorporated. In March, 1903, the Portage County Telephone Company was incorporated with a capital stock of $100,000. There are now 2,200 telephones in service in the county, 735 in Kent.

COMBINATIONS

FAIRMONT, W. Va.—The Consolidated Telephone Company, which controls all the Independent telephone lines in the northern part of the state, has taken over the Parsons Telephone Company.

SHINNSTON, W. Va.—The Bridgeport Telephone Company, Shinn's Run Telephone Company, Mulick Telephone Company and the Bingamon Telephone Company will consolidate and apply for a new charter at this place.

MATTOON, Ill.—The merging of the telephone systems of Oakland, Kansas, Isabel, Barton and Redmon into the Embarrass Telephone Company with a capital stock of $45,000 has been completed and the following officers elected: President, E. N. Blair; vice-president, J. H. Henn; treasurer, George Kirkpatrick; secretary,

J. D. Noel; directors, J. D. Noel, George Kirkpatrick, John Brinkerhoff, E. N. Blair, Clarence Arterburn, J. H. Henn and C. Pinnell.

TRANSFERS

ELLENVILLE, N. Y.—H. S. Wells of this place has purchased the Beaverkill Telephone Company.

NEOSHO FALLS, Kan.—The telephone exchange owned by H. F. Frezel has been purchased by O. B. Jones.

PRESTON, Ia.—The Jackson Telephone Company of this place has been purchased by the farmers in this vicinity.

AKELEY, Minn.—E. M. Irish, formerly owner of the local telephone exchange has sold the same to a stock company.

PRICE, Utah.—The Eastern Utah Telephone Company has acquired the Price and Duchesne telegraph line as an addition to its system.

RICHMOND, Kans.—R. M. Roberts, late of Kansas City, has purchased the Richmond Telephone Company, formerly owned by James Rambo.

ROCK VALLEY, Ia.—Donald McKellar, formerly of Sioux Falls, recently acquired the Independent telephone system at this place and has taken possession of same.

BLAIRSTOWN, N. J.—The West Jersey Toll Line, which operates between Blairstown and Belvidere, has been purchased by New York capitalists and will be reconstructed.

JEFFERSON, Ia.—The Greene County Telephone Company's lines in Washington township have been purchased by Amos Burk, Chas. States, John Munson and John Shoemaker.

PHELPS, N. Y.—The Phelps Telephone Company has been purchased by the Inter-Ocean Telephone Company. The system will be enlarged and connected with the Inter-Ocean lines.

PONTOOSUC, Ill.—Dr. Bortz, of Nauvoo, has purchased the telephone lines and exchange at this place, owned by Rand Starkweather. Dr. Bortz will install a new switchboard and improve the lines generally.

SAN DIEGO, Cal.—The Home Telephone Company has acquired the Clarke telephone line extending from Lakeside to the Stonewall mine at Cuyamaca and will entirely rebuild same at an estimated cost of $5,000.

PIGGOTT, Ark.—The Clay County Co-operative Telephone Company has purchased the stock of the Greenway Telephone Company and has consolidated it with its own. A 10 per cent dividend has been declared.

CAMBRIDGE, O.—The Home Telephone Company of this city has purchased the interests of the Noble County Telephone Company and the Stranathan & Milley Telephone Company and will make important improvements in the systems.

GRAND RAPIDS, Mich.—The Citizens' Telephone Company has purchased the telephone exchange at Reed City formerly operated by the Reed City Telephone Company. The system has over 300 telephones in service and the new owners will make improvements and additions to the service.

CHARLESTON, Ill.—The deal has been closed transferring the Charleston Telephone Company, in and about Charleston, to the Coles County Telephone Company of Mattoon for the consideration [illegible] practically placing all of the telephones in the county under one management.

THREE RIVERS, Mich.—The Three Rivers Telephone Company has purchased the Birch Lake Telephone Company. This company operates about 70 telephones in Porter township and has just completed two rural lines. The Three Rivers company now has about 700 telephones connected with its exchange.

SNYDER, Okla.—The Snyder Telephone Company has purchased all the property of the Topeka and El Reno Telephone Company in the town of Snyder. This ends the telephone fight which has been waged since last May and gives the home company long-distance connections with towns in Texas and Oklahoma.

READFIELD, Me.—Announcement is made that the Crosby Telephone Company of Readfield, which operates lines in Readfield, Belgrade, Mt. Vernon, Winthrop, Wayne, Fayette, East Livermore, Leeds, and Rome, has transferred its property to the Maine Telephone Company. The Crosby Telephone Company was organized in October, 1902, with a capital stock of $10,000.

SARANAC, Mich.—The Citizens' Telephone Company has purchased the Saranac Telephone Company's exchange in this place and its lines. There are about 200 telephones connected with the exchange and a demand for an extension of its lines into the country that will add at least 200 more telephones. The company has started a canvass of the surrounding country for the purpose of securing subscribers.

PHILADELPHIA, Pa.—By the purchase of 80 per cent of the stock, the Keystone Telephone Company of this city has acquired control of the Eastern Telephone Company of Camden, N. J. The latter company began operations in 1901 and has about 2,500 subscribers. The capital stock of the company is $250,000. The Keystone company assumes the indebtedness of the Eastern company, which is about $75,000. There is also a bond issue of $250,000 and the Keystone company has the option of taking the bonds at par. It is the purpose of the new owners to greatly improve the property.

ST. PAUL, Minn.—The Twin City Telephone Company has transferred all its property to the Tristate Telephone and Telegraph Company for a consideration of $4,000,000. Papers legalizing the transfer have been filed with the secretary of state and are signed by E. H. Moulton and H. W. Spooner, president and secretary respectively of the Twin City company. The transaction affects neither company. The Tristate company is merely the long-distance branch of the Twin City company, which is made a holding company for the Twin City. The change is said to have been made because the company had branched out so that "Twin City" was no longer an appropriate name.

LEGAL ITEMS

GUTHRIE, Okla.—L. W. Baxter, territorial auditor, states that he will appeal to the court to compel telephone companies to file with the territorial board of equalization estimates of their mileage and property, unless reports are filed in the near future.

TRENTON, N. J.—Under proceedings instituted against the Interstate Telephone Company, by J. Thomas Reinhardt, Oscar Keen, of Newark, receiver of the company, has filed in the court of chancery an inventory of the estate, property and effects of the concern. The total assets are scheduled at $584,578.65. The liabilities against the company are shown to be $34,186.37.

TRENTON, N. J.—The court of chancery has appointed Charles M. Myers of Newark as receiver of the Telegraph & Telephone Company of America, a large holding company with $30,000,000 capital stock. The liabilities are placed at $925,562, composed largely of unpaid assessments on stocks. The assets are $2,051,171, but are of uncertain value, it is said, being composed of stocks and bonds of subsidiary companies, most of which are inactive.

MUNCIE, Ind.—The long contested and expensive suit of the North Manchester Telephone Company against the Home Telephone Company of Wabash, growing out of the alleged breach of contract by the latter, has been decided in favor of the North Manchester Telephone Company by Judge Leffler of the Delaware Circuit Court, who permanently enjoined the Wabash company from doing toll business with any other company than the North Manchester company, when the lines of the latter could be used.

MISCELLANEOUS

GADSDEN, Ala.—The Gadsden Home Telephone Company will complete its new system about July 1.

VERMILLION, S. D.—The Twilight Club of this city has under consideration the installation of a local telephone system.

SYDNEY, N. S.—The Eastern Telephone Company has begun the construction of a new telephone line from Sydney to Broughton.

ABILENE, Tex.—The Roberts Telephone Company contemplates installing a new switchboard, magneto multiple, with 1,070 capacity.

LOUISA, Ky.—J. F. Ahlers is arranging for the establishment of a plant to manufacture locust pins for telephone and telegraph poles.

FT. WAYNE, Ind.—The new directory just issued by the Home Telephone Company shows that the company has 3,750 telephones in service.

SUMNER, Ia.—The Sumner Telephone Company is issuing a new directory which shows that the company has over 300 telephones in service.

DELPHOS, O.—A mass meeting of the farmers of this vicinity was held in this city recently to consider the matter of a mutual telephone exchange in Delphos.

ROME, Ia.—A telephone company has been organized here and two new telephone lines will be put in in the near future, which will connect with nearby towns.

GREEN BAY, Wis.—The Valley Telephone Company has issued a new telephone directory for Green Bay, De Pere and Wrightstown, which shows a list of 1,300 subscribers.

BURLINGTON, Ia.—The Mississippi Valley Telephone Company is placing its wires under ground. The company is negotiating for the purchase of a site for a new exchange building.

FINDLAY, O.—The Paragon Insulating Company is installing a plant at this place for the manufacture of insulating material for electric and telephone wires, conduits and like material.

BEATRICE, Nebr.—The Home Telephone Company, which was recently compelled to cease work in Wymore on account of the repeal of the ordinance by the city council of Wymore granting it a franchise, proposes to fight the case on the grounds that the council

has no authority to repeal the franchise, but that it is a question that the court must decide.

TORONTO, Ont.—The name of the Independent Long Distance Telephone Company, which has petitioned for a franchise in this province, has been changed to the Provincial Long Distance Telephone Company.

BRAZIL, Ind.—The Sixth District of the Independent Telephone Association of Indiana recently held a meeting in this city, at which time delegates were appointed to the state convention. J. G. H. Klinger of this city and Earl Talbot of Linton were appointed delegates to the national convention.

EVEREST, Kans.—The people of Everest recently held a meeting to consider the matter of installing a mutual telephone system and a temporary organization was effected and the following officers elected: President, W. H. Crouch; secretary, J. M. Johnson; directors, G. D. Bollinger, Nels Reed, and H. A. Price.

WEBSTER CITY, Ia.—A unique telephone war is reported at Webster City. The Martin Telephone Company recently raised the rates on telephones in physicians' offices to that paid by other business men, whereupon a majority of the physicians removed their telephones, and the telephone company proposes to hire doctors to locate there to compete with the local doctors.

HILLSBORO, N. C.—The Morris Telephone Company, with headquarters at Roxboro, has recently opened an exchange at this place. The company has under construction a system of toll lines, which it is claimed will ultimately reach every town in this section of the state. The officers of the company are as follows: President, R. J. Teague; secretary and treasurer, J. D. Morris.

OTTAWA, Ont.—The bill to incorporate the telegraph company, which is to operate the telegraph and telephone lines of the Grand Trunk Pacific, was passed in the Ottawa House of Commons. The capital stock is placed at $10,000,000. The incorporators are President Hays, Frank W. Morse, Wm. Wainwright, W. H. Biggar, and D'Arcy Tate of the Grand Trunk Pacific directorate.

TORONTO, Ont.—An effort is being made to incorporate an Independent Long Distance Telephone Company for the purpose of giving long distance connections to the Independent companies of which there are eight in the province of Ontario controlling 4,800 telephones. A bill has been introduced looking toward this end. The bill permits the company to manufacture telephones.

NEW YORK, N. Y.—President D. A. Reynolds of the Great Eastern Telephone Company states that the rights of his company to put telephone wires underground under the franchise of the New York Electric Lines Company, declared by the corporation counsel to be extinct, will soon be submitted to the courts in mandamus proceedings to compel the issuing of permits to the company.

CLEARFIELD, Pa.—The Huntington and Clearfield Telephone Company has just issued a new directory, which shows a marked increase in the number of its subscribers. This company has in operation seventeen exchanges, which furnish service to sixty-six towns and villages, besides connecting with nine rural telephone companies. The officers of the company are: President, Ellis L. Orvis; vice president, A. W. Lee; treasurer, G. H. Lichtenthaler; general superintendent, W. L. Malin.

MOBILE, Ala.—The stockholders of the Home Telephone Company held a meeting here recently for the purpose of revising their charter to allow for the building or extension of their lines all over the United States. Much interest was manifested at the meeting and it was proposed to push the work as rapidly as possible on the plant here and its extensions, as well as other work contemplated. The issuance of $350,000 was authorized by the board, to allow for the improvements and extensions in the lines.

LITTLE ROCK, Ark.—Preliminary arrangements looking to the establishment of a new long distance telephone system in Arkansas are being completed. Mr. John B. King, manager of the Independent Telephone Company of Texarkana, is in charge of these arrangements and is most enthusiastic over the outlook. It is the intention of those interested in the new venture to combine every Independent telephone system in the state into a single company so far as long distance work is concerned, but they will not be connected in a business way except for this purpose. A state press bureau will be established with headquarters in this city.

CEDAR, Minn.—A number of farmers in this vicinity recently held a meeting to discuss the advisability of organizing and incorporating a telephone company. The following committee was appointed to further consider the matter: Carl Sjogren, Jno. Ost, Chas. Swanson, Cedar; Aug. Peterson, Lars Carlson, Elm Creek; A. L. Gambrill, J. B. Johnson, Monterey. Another meeting will be held on the 19th inst.

TACOMA, Wash.—The Home Telephone Company of Puget Sound has filed a list of directors and officers with County Auditor I. M. Howell as follows: Charles E. Sumner, of Portland, Ore.; Edward E. Webster, Seattle; Roscoe E. Howard, Tacoma; William Mead, Los Angeles, and L. J. Beynon, Los Angeles. President, Charles E. Sumner; vice-president, L. J. Beynon; secretary, Edward E. Webster; treasurer, Roscoe Howard.

JOHANNESBURG, TRANSVAAL, S. A.—Johannesburg, with a population of 80,000, has a telephone system owned and operated by the government of the Transvaal Colony, and comprises 1,500 subscribers. There is one central office, with 1,486 direct lines. Eighty-five outside extension telephones and 190 inside extension telephones connect with these direct lines. The rates are governed by distance and number of connections. There is no measured service.

SYCAMORE, Ill.—The DeKalb County Telephoine Company has nearly 2,200 telephones in use as shown by the directory which has just been issued. This company was incorporated in 1894 with a capital stock of $3,000, which has since been increased to $150,000, and began operatioin with 50 telephones. The company was organized with the view to supplying service in Sycamore alone, but its lines have extended until they cover almost the entire county.

SHELBYVILLE, Ky.—The receiver who has been operating the Shelby Home Telephone Company for several months, has been discharged by the court, and the company in charge of the affairs of the Home plant will henceforth be known as the Shelby County Telephone Company. The growth of the Home company has been steady and very satisfactory to those interested. Besides the exchange in this city, exchanges have been opened in Waddy, Bagdad and Simpsonville, and a plant will be opened in Finchville in the near future.

JESUP, Ia.—In response to invitations sent out by Dr. E. W. Harradon, president of the Jesup Mutual Telephone Company, a meeting of persons interested in the mutual telephone movement was held in this city recently, at which plans were formulated and set in motion, which will simplify the method of interchange of business between all mutual-independent companies, and will assure the proper and speedy growth of all such companies. C. A. Hollis, manager of the Farmers' Mutual Telephone Company of Hudson, Ia., was appointed state agent for Iowa.

COLUMBUS, Kan.—The Cherokee County Mutual Telephone Company recently held a convention in this city. Reports showed a steady growth of the business until now there are 750 telephones in service in the county. A number of toll lines have been constructed during the past year and besides new toll lines to be constructed the present year a large number of local lines are being organized which will extend the service to almost every point in the county. The officers of the company are as follows: President, Wm. Shaffer; treasurer, Emerson Hull; secretary, M. A. Householder.

VINCENNES, Ind.—The controlling interest of the Knox County Home Telephone Company of this city, which is owned by W. R. Gardner, William Morrison, and A. H. Yoder, of Toledo, has been pooled with the Central Home Telephone Company of Louisville, Ky., of which they have become directors, the deal having been closed by William Morrison and Auditor L. G. Parker, the latter being of the Louisville company. W. H. Moore, the present superintendent, will remain in office, as will also the directors. The Home company has 1,300 telephones in this city and connects with almost every other exchange in the county, and gives free service over the whole of Lawrence county, Illinois, just across the river. Bloomirgton, Seymour and Bedford exchanges have also entered the pool and obtained long-distance service with the Kinloch company of St. Louis, which is allied with the Louisville company.

A Row of Telephone Babies.

ITEMS FROM THE RURAL LINE DISTRICTS

Illustrated by R. McMahon

The telephone men are moving down the line.—*Waverly Jottings in Ft. Collins (Col.) Express.*

The rural telephone has got its line in talking order.—*Drury Items in Wellington (Kan.) Voice.*

A telephone line is being run over Waterboro hill.—*Kennedy Notes in Jamestown (N. Y.) Journal.*

The new telephone line is now in operation and the rubber necks are having an inning.—*Enid (Okla.) Events.*

The telephone poles that a week ago ornamented the center of Cat street have been moved east.—*Kinsley (Kans.) Graphic.*

There is strong talk of a telephone line to be put in through this vicinity soon.—*Big Creek Notes in Reedsburg (Wis.) Times.*

The Farmers' Telephone Company has the old Eash house almost moved to Sharon.—*Sharon Center Gossip in Kalone (Ia.) News*

The telephone men are putting the people in this neighborhood on speaking terms with the rest of the world.—*Mulhall (Okla.) Journal.*

Work was temporarily stopped on the telephone work at Mandan, and The Republican was keeping an eye on the poles.—*Mandan Republican.*

The telephone switch has been moved from Marius Rynning's to the residence of Mrs. Mina Smith.—*Ostrander Items in Preston (Minn.) Times.*

We will soon be calling "Hello Central!" as the telephone poles are being strung out. Mr. Griffin is furnishing the poles.—*La Valle (Wis.) Leader.*

The White Oak Telephone line was divided last week and now runs two wires to Central instead of one.—*White Oak News in Bonaparte (Ia.) Record.*

We hear that Mr. Pearl Shattuck has a telephone in now. That's right, Pearl, keep up with the times and make good use of your telephone.—*Hastings (Neb.) Tribune.*

Unless more common decency is used by some parties who use the telephone accommodations, there will be a telephoneless family or so, soon.—*Formosa (Kans.) New Era.*

Mr. Blessing, manager of the West Milton Home Telephone Company was here a day of last week and took out the telephone box which was in the residence of Tom Kessler.—*Kessler Items in Troy (Ohio) Democrat.*

Milner is crying for a telephone system. She ought to have it. By the time a native walks from one end of the street to the other to convey a message he is too tired to work any more that day.—*Milner Notes in Griffin (Ga.) News.*

Josie Myers, who has been "Central" at the telephone office, is now seen in her accustomed place no more, for she has been succeeded by Ida Guse. Josie is now helping her father in the meat

market and provision store. She is a cracking good girl and can turn her hand to most anything. We will miss her when we go to ask about "25."—*Fairbury Items in Hebron (Neb.) Champion.*

Hopewell vicinity will soon be in touch with the outside world. The telephone company will put in a number of telephones including your correspondent, as soon as the weather will permit.—*Hopewell News in Richmond (Ohio) Gazette.*

Miss Lela Huston has resigned her position as "phone girl' in the Southwest Telephone Company office, and will go East for several months' visit. Miss Huston is one of the best telephone girls in Kansas and to say she always attended to business is putting it mild.—*Meade (Kans.) Globe.*

CLASSIFIED ADVERTISEMENTS

And want advertisements not exceeding twenty words exclusive of address, will be inserted in these columns for $1.00 each. If over twenty words the rate will be 5 cents per word.

WANTED—25 competent cablemen at current wages. Pioneer Telephone & Telegraph Co., Oklahoma City, O. T.

FOR SALE—A 250 telephone exchange located in a good business town in eastern Kansas. Good paying property and growing rapidly. Addresas 345, care TELEPHONY.

WANTED—New magnet wire, any size or quantity, for cash. We buy anything and sell everything electrical. The Amber Electric Mfg. Co., 60 W. Monroe St., Chicago, Ill.

WANTED—First-class automatic telephone and switchboard switchman; position permanent. Address, with references, Home Telephone Co., Santa Monica, California.

WANTED—Second-hand Globe (or National) automatic switchboard, with fifty or more switches mounted. Must be in good condition. G. E. Merrill, 1208 Tower Ave., Flat 2, Superior, Wis.

FOR SALE—Six 100-pair and eleven 50-pair Sterling inside terminals with heat coils and carbons, complete. Will sell separately or all together. Macon County Telephone Company, Decatur, Ill.

FOR SALE—Telephone exchange, 160 telephones. Town and part of country lines rebuilt new. Good territory. Town growing. Population of town 500. Address Turon Telephone Company, Turon, Kan.

WANTED—A young man technically educated who has had some experience in designing and operating telephone systems. Management of plant given to right party. Address 344, care TELEPHONY.

FOR SALE—A 225 telephone exchange located in good business town in a rich agricultural district in Illinois. Good paying property and growing rapidly. Price, $4,500.00 Address No. 340, care TELEPHONY.

WANTED—Two or three first-class specialties for the telephone trade—something that can be handled to advantage with our Adjustaphone. Address The Adjustaphone Co., 945 First National Bank Bldg., Chicago.

WANTED—First-class telephone installers; also man accustomed to wiring branch exchanges. None but competent men need apply. Good wages and permanent position. Address P. K. Higgins, Gen. Del., Milwaukee, Wis.

FOR SALE CHEAP—3 sections American Express type switchboard, 25, 50 and 100 drops. Also one 200-line metallic distributing rack and arrester. All in fine order. Will sell any or all. Address Box 188, Owenton, Ky.

FOR SALE—A 25-year telephone franchise in a county seat town of 3,000 and 30 miles of toll line. A fine proposition for any one who has the money to build the exchange. West Central Illinois. Address L. E. Cutler, Abingdon, Ill.

FOR SALE—Two 200-drop Eureka Express Boards, newly rewired and tested out, complete with new cords, receivers and generators. All in good shape. Also extra drops, ringing keys, etc. Cheap. Address 343, care TELEPHONY.

POSITION WANTED—At liberty June 25th, a good combination trouble and all-around telephone man. Long experience. Good references. Please state your requirements, hours, and salary paid. West or southwest preferred. Address F., care L. E. Dalton, Whitestone, L. I., N. Y.

FOR SALE OR TRADE—Telephone system operating four exchanges in central Nebraska, 1,000 telephones now installed, and territory unlimited for extension; 75 miles of full metallic toll line, reaching four counties; no competition. Reason for selling; part owner must change climate. Would consider trade for western Nebraska, Kansas or Dakota land. Address, Belgrade Telephone & Improvement Co., Belgrade, Nebr.

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AN ILLUSTRATED MONTHLY TELEPHONE JOURNAL

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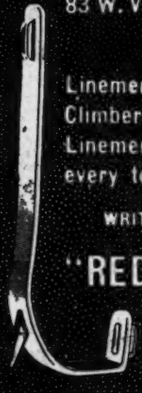

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ADVERTISING INDEX, PAGE 2.

CLASSIFIED ADVERTISERS INDEX, PAGES 94, 95, 96 AND 97.

Washington Fir Cross Arms

Are manufactured in the State of Washington, shipped from there to the natural distributing point, **St. Paul** and from **St. Paul** distributed to all United States points.

We are the distributors and carry nearly 200 car loads, assorted sizes, in St. Paul Stock. Our prices are lowest. Prices on application.

CAR LOAD BUSINESS SPECIALLY SOLICITED

But same attention given orders for one Cross Arm as for a car load. We carry the largest stock of Genuine BB Telephone Wire, Insulators, Brackets, Pins, Bolts, Braces, Tools, Batteries and Telephone Line Construction Material in the northwest.

We have three stocks of Genuine BB Telephone Wire to ship from i. e.: St. Paul, Chicago and Waukegan, Ill.

SEND YOUR ORDERS TO THE DISTRIBUTORS

The St. Paul Electric Co., 316 ROBERT STREET ST. PAUL, MINN.

The Indiana Rubber & Insulated Wire Co.

Manufacturers of

Insulated Wires and Cables

PARANITE

JONESBORO, : IND.

SAMUEL G. McMEEN. **KEMPSTER B. MILLER.**

TELEPHONE ENGINEERS

1454 and 1456 Monadnock Block,

CHICAGO.

Complete Plants Laid Out. **Construction Supervised.**

Expert Examination. **Advisory Reports.**

Alphabetical Index to Advertisers

Abeles & Taussig 91
Acme Electric & Telo. Co..... 53
American Conduit Co. 46
American Elec. Fuse Co.....22-23
American Elec. Telo. Co.32-33-100
American Electric Works....100
American Wood Preserving Co. 28
Andrae & Sons Co., The Julius 11
Andrews & Co., A. H..... 93
Appleton Electric Co. 36
Austin & Co., M. B..... 9
Automatic Electric Co. 59

Baird Mfg. Co. 34
Baumflek & Co. 34
Beidler & Co., Francis 92
Belfield, A. M. 97
Belden Mfg. Co. 100
Bissell Co., F. 18-34
Blackburn, Geo. R. 100
Blake Signal & Mfg. Co..... 99
Blakeslee Forging Co. 100
Brooks Co., Hall L..... 88
Bruer, W. F. 97
Burns, W. J. 54
Butterfield Construction Co... 92
Buyers' Directory 94-95-96-97

Cadiz Electric Co. 47
Calculagraph Company 4
Camp Co., H. B. 93
Carbolineum Wood-Preserving Co. 100
Central Electric Co. 46
Central Elec. Mfg. Co. 83
Central Telo. & Electric Co... 36
Century Telo. Const. Co..... 51
Chase-Shawmut Co. 49
Chicago Brass Co. 44
Chicago Insulated Wire Co... 99
Chicago Telo. Supply Co....1-3-5
Churchill Cabinet Co. 99
Churchill Cedar Co. 92
Classified Index 94-95-96-97
Clement, Edward E. 48
Climax Mfg. Co. 99
Commercial Elec. Supply Co.. 98
Conover, Geo. W. 54
Cook, Frank B. 37
Crawfordsville Wire & Nail Co 94
Croselmire & Ackor Co..... 98
Crumb & Co., W. H..... 98
Cruver Mfg. Co. 25
Current Elec. Co. 24
Cutter, Scott C. 14

D. & W. Fuse Co. 48
Darby & Sons Co., Edward.. 58
Dean Electric Co. 17
Dearborn Electric Co. 1
Delaware Hard Fibre Co..... 98
Doubleday-Hill Elec. Co. 14
Duluth Log Co. 89
Dumert Lbr. Co., C. H..... 89

Eagle Electric Co. 54
Electric Appliance Co. 21
Elec. Mfg. & Equip. Co..... 14
Electrical Trades Exposition Co. 56
Eureka Electric Co. 29
Ewing-Merkle Electric Co..... 8

Fahnestock Electric Co. 40
Farr Telephone & Construction Supply Co. 36
Faultless Insulating Compound Co. 30
Felsenthal & Co., G..... 83
Fisher-Stevens Co. 20
Fisk-Newhall Telo. Mfg. Co.. 94
Fowler & Co., John H..... 91
Frankel Display Fixture Co.. 92
French Battery Co. 4

Galloway Co., J. B..... 54
General Elec. Co. 38
General Engineering Co. 1
General Insulate & Mch. Co... 10
Globe Automatic Telo. Co..... 45
Gould Storage Battery Co..... 28
Gray Telephone Pay Station Co. 11
Groves & Co., D. G..... 89

Hallett Iron Works 52
Hans Construction Co. 92
Helios Mfg. Co. 50
Hemingray Glass Co. 6
Holtzer-Cabot Elec. Co. 34
Huebel Co., C. J. 86
Humbird Lumber Co. 85

Illinois Electric Co. 19
Independent Dry Battery Co.. 32
Indiana Rubber & Ins. Wire Co. 2
Indiana Steel & Wire Co..... 38
International Telephone Manufacturing Co. 52

Jaeger Miniature Lamp Mfg. Co. 100
Johnson Elec. Mfg. Co. 28
Jones & Winter 1

Kennett Cypress Hardwood & Lumber Co. 88
Keystone Elec. Telo. Co..... 32
Klein & Sons, Mathias 1

La Salle Battery Co..... 18
Leeds & Northrup Co. 99
Lindsley Bros. Company 87

Maine Hub & Mfg. Co..... 97
Manhattan Elec. Supply Co... 40
Mason, Edward Z. 90
Matthews & Bro., W. N..... 95
McMeen & Miller 2
McRoy Clay Works 1
Mears Ear Phone Co. 44
Middleton & Co., J. W..... 98
Miller Anchor Co. 4
Monarch Elec. & Wire Co.... 30
Monarch Telephone Mfg. Co.26-27
Moon Mfg. Co. 16
Morgan & Wright 46
Morrison Lbr. Co., J. W..... 91
Mountain State Electric Co.. 97
Mueller Co., Wm. 92
Mullin Co., Colman J. 58
Murdock & Co., W. J. 100

Nagel Elec. Co., W. G..... 41
Nash & Co., Geo. 99
National American Telo. Co.. 54
National Battery Co. 38
National Carbon Co. 93
National Galvanizing Co. 100
National India Rubber Co..... 83
National Telephone Supply Co. 95
Naugle Pole & Tie Co..... 84
Nebraska Electric Co. 44
N. Y. Insulated Wire Co..... 1
North Electric Co. 39
North Penn Iron Co. 10
Norton Tool Co. 18
Nungesser Electric Battery Co 40

Okonite Co., Ltd. 13-83
Oliver Iron & Steel Co..... 44

Pacific Coast Pole Co..... 90
Page & Hill Co. 90
Partridge Lumber Co., T. M.. 89
Peirce Specialty Co. 12
Pendleton & Gilkey 91
Pittsburgh & Lake Superior Iron Co. 86
Plume & Atwood Mfg. Co..... 99
Plymouth Novelty Mfg. Co.... 58
Pocket Meter Co. 99
Premier Electric Co. 20

Raber & Watson 87
Richards Chair Panel Co..... 24
Rock Island Battery Co. 96
Roebling & Sons Co., John A. 48
Roth Bros. & Co..... 16
Runzel-Lenz Elec. Mfg. Co... 6

St. Paul Elec. Co..... 2
Sand Point Cedar Co..... 88
Sandwich Pole Changer Co... 35
Scoville Mfg. Co. 1
Scranton Button Co. 96
Select Telo. Mfg. Co. 12
Standard Underg'd Cable Co.. 1
Steel Gain Mfg. Co. 54
Sterling Electric Co. 60-61
Sterling & Son, W. C..... 90
Stevens Co., Charles G..... 1
Stromberg - Carlson Telephone Manufacturing Co. 42-43
Sumter Telo. Mfg. Co..... 57
Swedish Am. Telephone Co.. 62

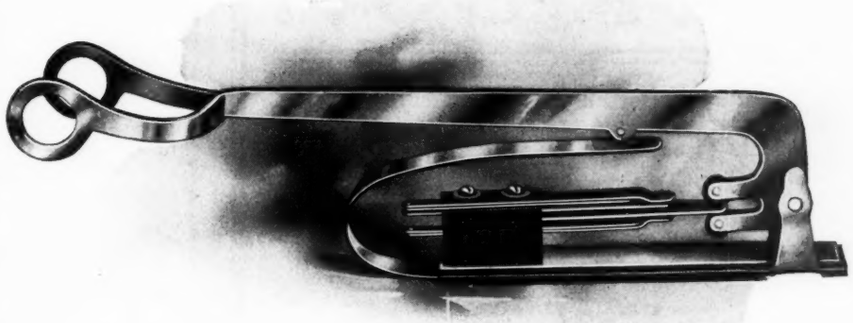
Telephone Engineering Ass'n. 56
Telephone Printing Co. 99
Thornton & Co. 54

Universal Cable Grip Co. 16
U. S. Coin-Register Co. 7

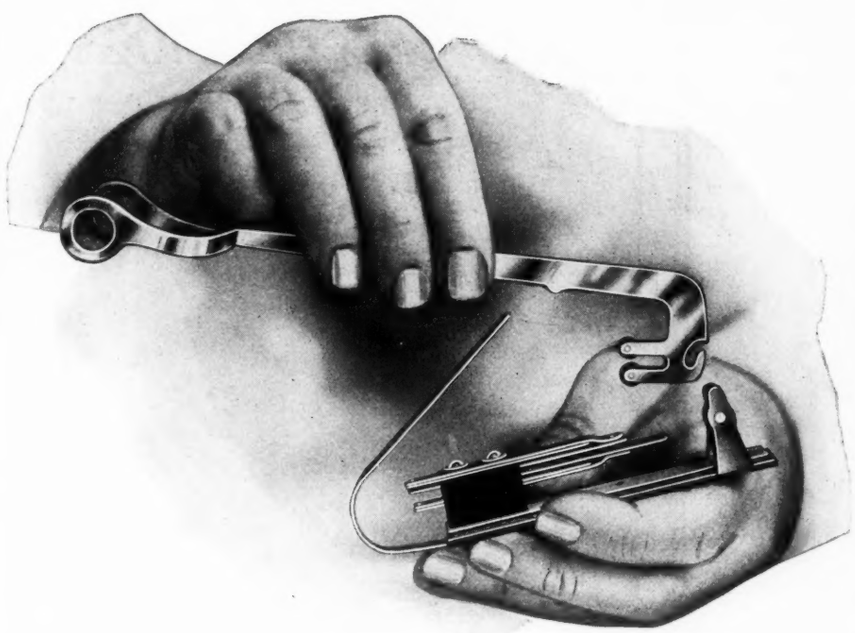
Valentine-Clark Co. 84
Veeder Mfg. Co. 97
Viaduct Mfg. Co. 38
Vogel & Co., Herman 91
Vote-Berger Co. 15

Want Advertisements 432
Wapak Hollow Ware Co..... 98
Warner Electric Co. 20
Wesco Supply Co. 58
Western Insulated Wire Co.. 48
Western Telephone Mfg. Co.. 31
Weston Elec. Instrument Co.. 50
Whitmore, A. E. 91
Williams-Abbott Electric Co. 55
Williams Telephone & Supply Co. 10
Wilson Co., J. I. M. 91
Wire and Telephone Co. of America, The 8
Wittenberg Cedar Co. 90
Worcester Co., C. H. 85
Yonkers Specialty Co. 100

Don't Fail to Examine This Switch Hook at the Convention. Rooms 620-622-624.



This switch is used on all Chicago Telephones and has many distinctive features which will appeal to telephone men. Of course, like other hooks it has springs made of pure spring German silver, with platinum contacts; tempered steel tension spring; long stamped one piece switch lever; stamped base, and pure rubber mounting block. In addition to these regular features, however, this hook has stops behind each contact spring so the latter may be mounted under considerable tension. Further, the construction of the hook lever is of such a character that it may be removed without the use of tools—see illustration—and when in normal position the pivotal point is almost frictionless and cannot get out of adjustment. Note that this hook is NOT held in place by a shoulder screw. In addition to these features rollers are provided for all points of contact between the hook lever and the tension springs and contact springs.



These catalogs are at your disposal:

43—General.
44—Bridging and Series Telephones.
45—Bell Type Express Switchboards.
46—Visual Signal Switch and Toll Boards.
47—Common Battery Apparatus.

Chicago Telephone Supply Co.

Factory and Principal Office - - - ELKHART, IND.

Pacific Coast Sales Agency: KILBOURNE & CLARK CO. Seattle, Washington / San Francisco, California

Please tell the Advertiser you saw his Announcement in TELEPHONY.

NOTICE!

BEWARE OF

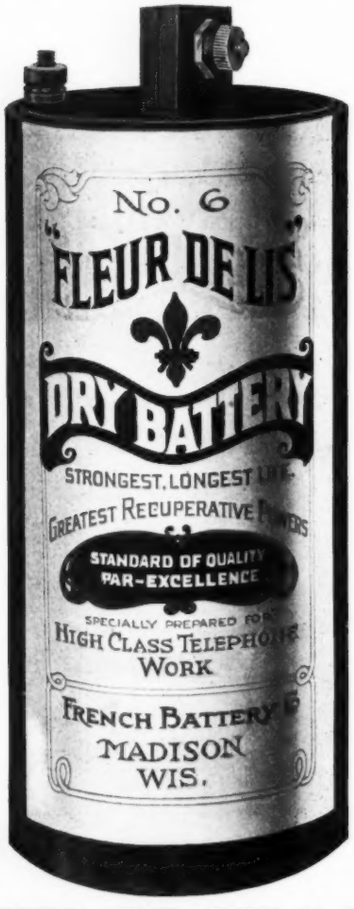
FAKES!!

Do not allow yourself to be humbugged again. You are not compelled to take the opinions or bare statements of others on this proposition.

Investigate For Yourself!

WRITE FOR A SAMPLE SHIPMENT

Six, Twelve or Twenty-Four Cells



"FLEUR DE LIS" No. 6

beats any other battery on the market. "FLEUR DE LIS" No. 6 is making a reputation for itself. Every mail brings us new contracts for "FLEUR DE LIS" No. 6 from the telephone trade.

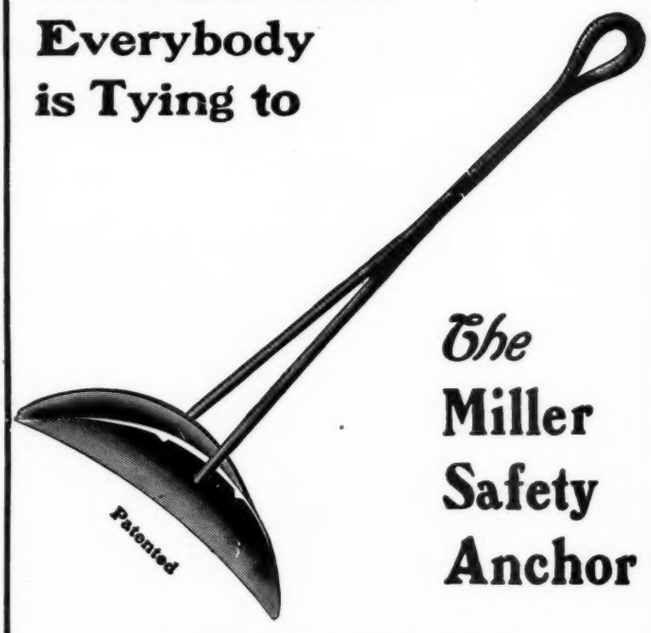
"BE WISE TO-DAY; 'TIS MADNESS TO DEFER."

On account of growing business and demand for increased capacity, we have moved our factory from Chicago to Madison, Wis. Please note the new address:

French Battery Co.

MADISON, WISCONSIN

The Kind that Everybody is Tying to



The Miller Safety Anchor

LARGEST, CHEAPEST AND BEST

"THEY NEVER PULL UP"

MILLER ANCHOR CO., Norwalk, O.

THE CALCULAGRAPH

enables a telephone company to charge for ALL THE EXCESS MINUTES of every toll conversation. It is the only way to do it accurately.

It relieves the service of one of its most serious drags—the work of calculating the time by reference to a clock. Consequently, the efficiency of the service is greatly increased.

The excess minutes are the profits of your toll line. The Calculagraph makes the profit for you. An operator's eye and pencil and a clock won't do it.

The Calculagraph Makes no Clerical Errors

SEND FOR OUR BOOKLETS. THEY GIVE VALUABLE DATA ABOUT EXCESS MINUTES ON TOLL LINES

THE CALCULAGRAPH CO.

1416 Jewelers Building NEW YORK CITY

Please tell the Advertiser you saw his Announcement in TELEPHONY.

A GOOD DESK SET

With all the Chicago features at a Price that Satisfies

MEET US AT THE CONVENTION

Rooms

620

622

624

These catalogs are at your disposal:

43—General.
44—Magneto Telephones.
45—Bell Type Express Switchboards.
46—Visual Signal Switch and Toll Boards.
47—Common Battery Apparatus.

Chicago Telephone Supply Co.

Factory and Principal Office - - - ELKHART, IND.

Pacific Coast Sales Agency: KILBOURNE & CLARK CO. Seattle, Washington / San Francisco, California

The R-L Cords

The R-L Insulating Compound for Pot Heading and Cable Splicing

The above is more than a trade mark. It stands for better service and lower cost of maintenance.

It has been our aim to make switchboard cords that would wear longer than any other. We use the best raw material it is possible to obtain and spare no pains in workmanship.

As evidence that they do wear longer many of the leading independent operating companies and manufacturers are using them exclusively.

Suppose you write for a list of companies using them and our prices, or send us a trial order—that's the best test. We guarantee satisfaction.

This shows Construction of R-L Cord

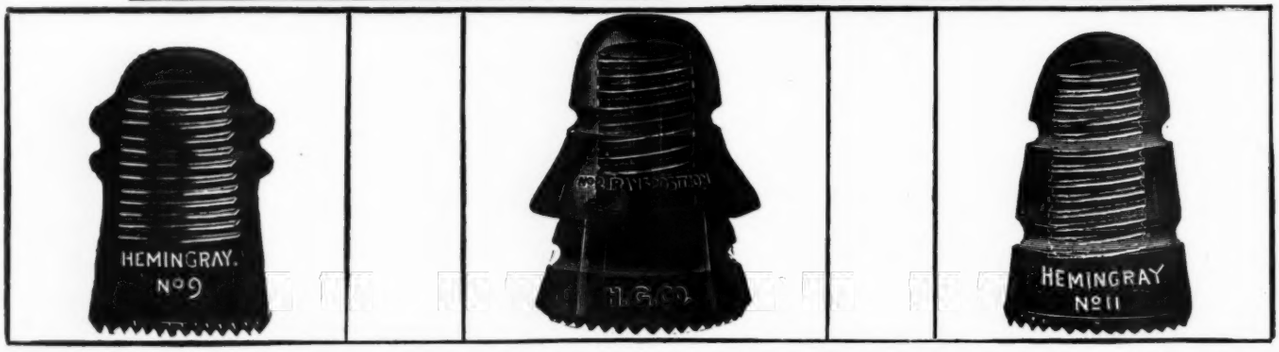
This shows construction of Premier BB Cord formerly manufactured by McDermid Mfg. Co.

Runzel-Lenz Electric Manufacturing Co.

97-101 South Clinton Street, Chicago

THE STANDARD "HEMINGRAY"

ALL WITH THE "PATENT DRIP PETTICOATS."



THE HEMINGRAY-GLASS CO.

Office, Covington, Ky. Factory, Muncie, Ind.

ESTABLISHED 1848

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Combined Cash Register and Pay Station

A Telephone Detective
A Correct Measured Service Pay Station
A System that Never Fails
A Pay Station Without an Equal

THE TAPE

Records All Deposits
Issues a Cash Ticket With Every Collection
Cash Always Accounted For
Every Station a Cash Register

NO ERRORS——NO DISPUTES——NO TROUBLE

A Tape Numbered from 1 to 2000 Does the Work

SINGLE COIN

LOCAL

No Confusion of Sounds

The Signals are All Given From One Gong

ONE RING FOR 5 CENTS
TWO RINGS FOR 10 CENTS
FIVE RINGS FOR 25 CENTS

Measured Service

THREE COIN

LONG DISTANCE

It cannot be tampered with
It registers correctly
It protects patron and company
It keeps your collections right
It looks right
It is right
It increases your business
It makes you money

DESK SET

On opening the cash box the tape is automatically cut off and deposited in the money box, thus providing a check or cash ticket to be taken to the auditor with the money

Write at once for Catalogue

The United States Coin Register Co.

27-31 ST. CLAIR STREET, TOLEDO, OHIO

THE
WIRE & TELEPHONE CO., OF AMERICA

HEAD OFFICE AND WORKS:
ROME, N. Y.

SUCCESSORS TO

THE
ELECTRIC WIRE WORKS.
ROME, N. Y.

THE
EMPIRE WIRE CO.,
ROME, N. Y.

BARE AND INSULATED COPPER WIRE

Bare and Tinned Copper Wire.
Hard Drawn Telephone Wire.

Cotton and Silk Magnet Wire.
Romeoid Rubber Covered Wire.

TELEPHONE DEPARTMENT

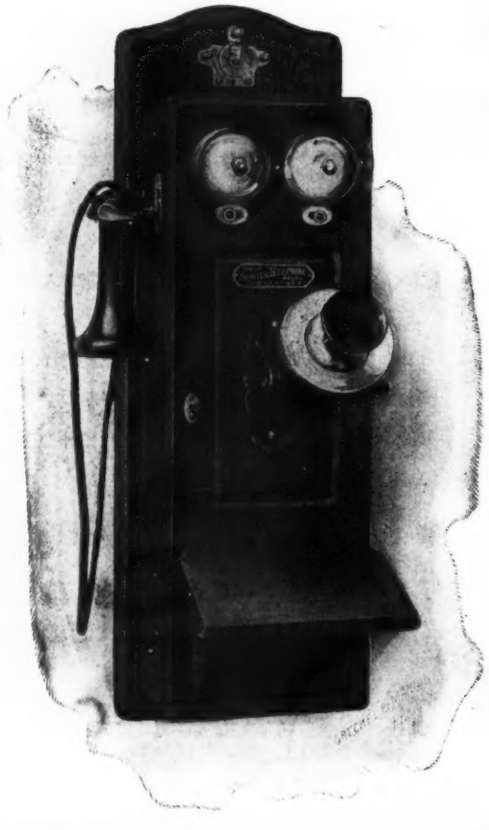
MANUFACTURING, CONSULTING, CONTRACTING ENGINEERS

FOR

OFFICE, FACTORY, HOTEL AND APARTMENT HOUSES
TOWN, CITY AND COUNTRY
TELEPHONE SYSTEMS

ASK FOR
BULLETIN No. 100

ASK FOR
"COPPER HISTORY"



We Believe That
This Telephone

TRADE EVERBEST MARK

Is best suited to your requirements. We can rush shipments, stock and our price is right.

"Sumter" Quality—"Everbest"

Ask for Bulletin No. 39

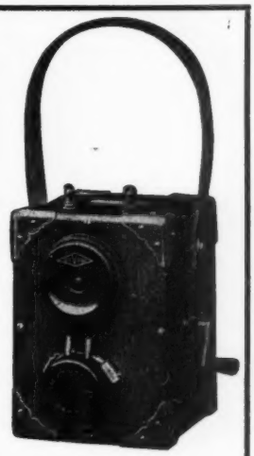
EWING-MERKLE ELECTRIC COMPANY

St. Louis :: Missouri

No. 60 Pocket Torch
Light with a match, makes its own gas. Burns gasoline

SAFETY

Braided and Twisted Duplex Telephone Wire



Test Sets
Series and Bridging

THE PERFECT PIN

KALKEEN PINS

PROMPT SHIPMENTS ALWAYS

GET OUR PRICES

Operator's Chair

SELLING AGENTS

"Security" and "Novelty" Specialties
Washing Fir Cross Arms
"National" Iron Wires
"Safety" Rubber Covered Wires

Pole Seats

M. B. AUSTIN & CO.

133 to 141 West Jackson Boulevard :: :: CHICAGO

Please tell the Advertiser you saw his Announcement in TELEPHONY.

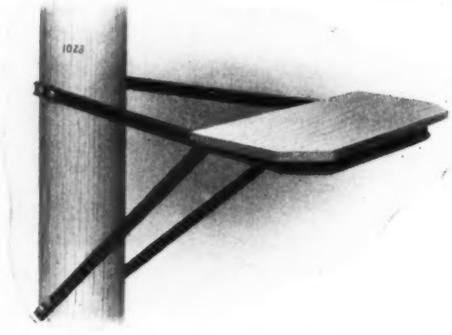
Telephone Construction Material—

25-PAIR DISTRIBUTING RING

Codeword—*Tuable* Diam. 4 feet

POLE SEAT No. 257

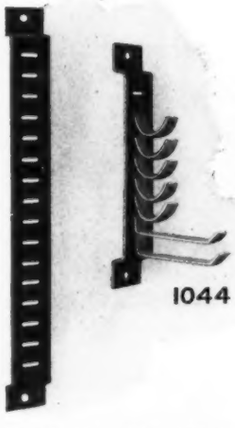
Codeword—*Trullo* Weight, 22 lbs.



CABLE HOOKS AND HANGERS

Hooks
Large—*Tubero*
Small—*Taocaro*

Hangers
Large—*Tubage*
Small—*Tubator*



Have you our Bulletin No. 27?

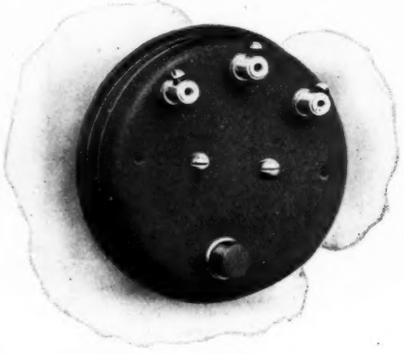
The North Penn Iron Co.
PHILADELPHIA, PA.

Equip all your Party lines with

PUSH BUTTONS

Enabling you to call central without disturbing the other parties.

Our metal case push button can be attached to any telephone without disturbing the present wiring.



Neat

Simple

Effective

Thousands in use; gives you up-to-date service on your old lines.

See us at Room 656, Auditorium Hotel, Chicago, June 26-27-28.

The Williams Telephone & Supply Co.
57 Central Avenue, Cleveland, Ohio

General Insulate and Machine Co.

MANUFACTURERS OF

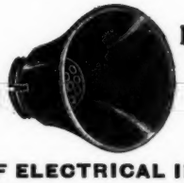
SEAMLESS RECEIVER CASES

Mouthpieces Handles, Knobs

SEAMLESS SEAMLESS

Quality Unrivaled Superior Finish

Unexcelled in Mechanical Detail Highest Grade Compound



ALL KINDS OF ELECTRICAL INSULATIONS

General Insulate and Machine Co.

Factory: 1008 to 1014 Atlantic Ave. Brooklyn, New York Tel. Main 3924 1214 Chicago Stock Exchange Bldg. CHICAGO, ILL.

Form No. 13-4-05. 20M

KEYSTONE TELEPHONE CO.

ADDRESS ALL COMMUNICATIONS TO THE COMPANY

PHILADELPHIA, November 21, 1905.

Gray Telephone Pay Station Co.,
Mr. Geo. A. Long, Sup't
Hartford, Connecticut.

Gentlemen:-

Yours of the 17th at hand and noted. We have found the Gray Automatic pay stations very satisfactory and the cost of maintenance very low, as compared with anything else we have used.

Yours very truly,
KEYSTONE TELEPHONE CO. OF PHILA.,
General Manager.

2000 Sold in ONE Order To the Keystone Telephone Co.

It's A GRAY

Gray Telephone Pay Station Co.
HARTFORD - CONN.

They Have Used Others
They Now Use the Gray
Why? Entirely Automatic
No Levers

Save Money on Condensers

IN TWO WAYS

Lower Prices—Less Time Used in Installing Them

Iron Box Condenser No. 300

¶ All the tools needed are 1 screwdriver, 2 screws and 3 minutes time.

¶ That's how our No. 300, No. 301 and No. 186 are put in.

¶ On party lines, condensers are as essential to perfect service as the current itself.

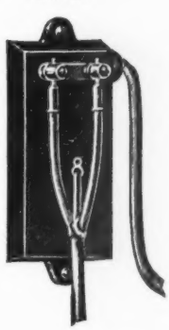
¶ You can talk just as well if the other receivers are off the hooks.

¶ *Just to show you how they improve the service*, we'll equip your line with our condensers *free of charge.*

¶ Use them 30 days, and if they are all we claim, send us the price—or, if you don't like them, send them back—we'll pay the freight.

¶ Better send for our new circular—the prices in it are lower than in the old ones.

Iron Box Condenser No. 301



No. 217 West Water Street **Julius Andrae & Sons Co.** Milwaukee, Wisconsin

PEIRCE SPECIALTY COMPANY

Just A Word To Customers:

The Peirce Specialty Company, planning for a normal growth, very considerably increased their manufacturing facilities for handling this summer's business. The growth of their business has so far exceeded their expectations, that they have thus far been unable to catch up with their orders. A further lot of machinery has been added and both day and night shifts are at work. The Peirce Specialty Company hope to be able to ship direct from stock within thirty days.

PEIRCE SPECIALTY COMPANY

241 South Jefferson Street :: :: :: :: :: CHICAGO, ILLINOIS

Central Energy Lock Out

SOMETHING NEW

Over 1,000 in Use in Ohio

NO GROUND - FULL METALLIC - POSITIVE - SIMPLE

Absolutely No Changes or Additions in the Central Office

Can be Connected to any Central Energy Telephone in Fifteen Minutes

It will work in Connection with any Common Battery Board

EVERY MACHINE GUARANTEED

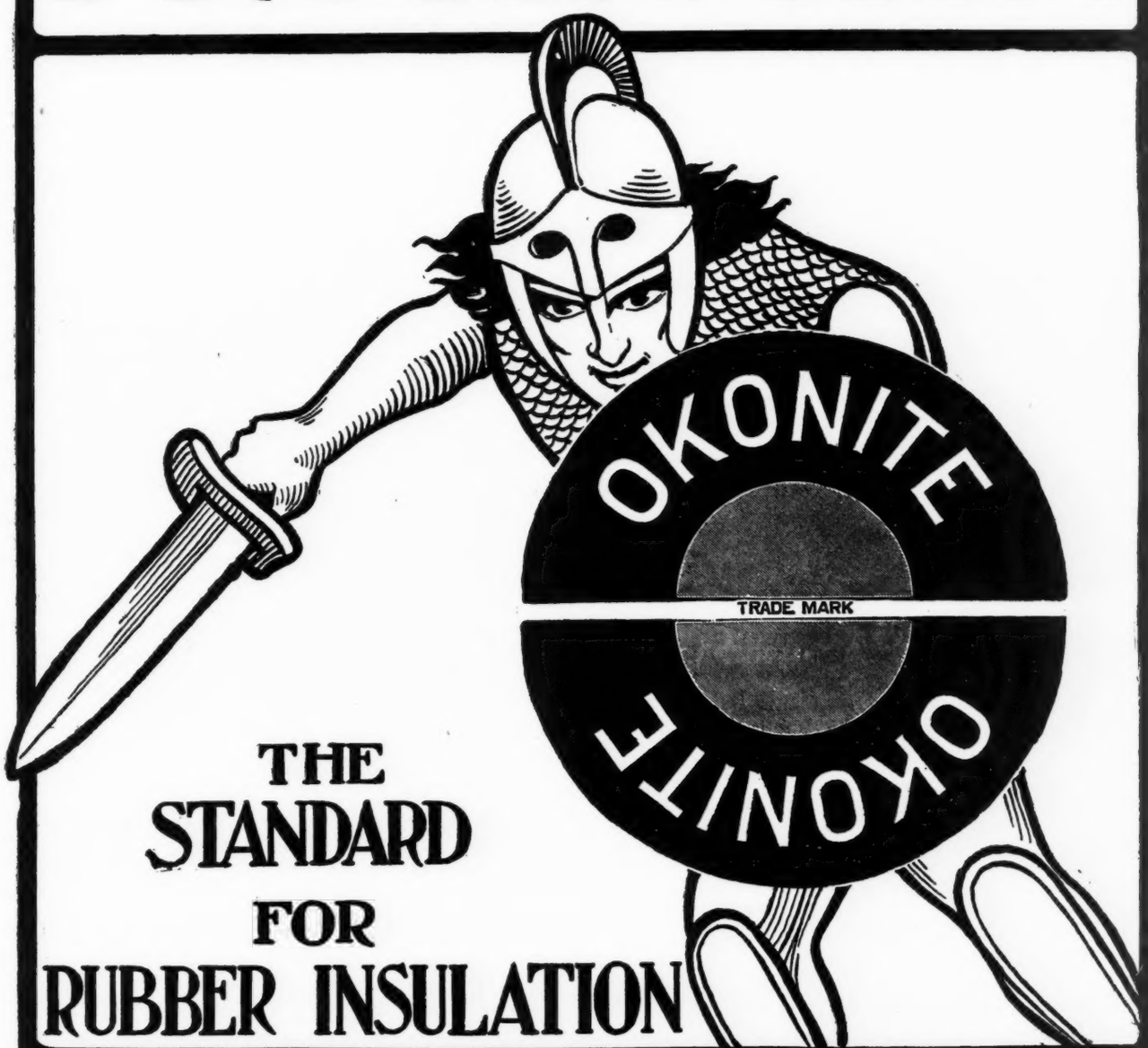
IT WILL PAY YOU TO LOOK INTO THE MATTER

WRITE FOR DESCRIPTION AND PRICES

The Select Telephone Mfg. Co. Springfield, Ohio

Please tell the Advertiser you saw his Announcement in TELEPHONY.

PERFECT PROTECTION



THE STANDARD FOR RUBBER INSULATION

The OKONITE COMPANY Ltd
Manufacturers of Insulated Wires and Cables
253 BROADWAY NEW YORK CITY.

Man'frs Adv. Bureau N.Y.

Wotton
ATLANTA

How long since you have seen an honestly made Telephone Cabinet?

If interested in High Grade Instruments of any type write

ELECTRIC MFG. & EQUIPMENT COMPANY

A Telephone Blessing at a Minimum Cost

Does your line ring grounded.
Do your bells ring loud and distinct.
Can your subscriber always signal its office.
Have you figured the cost per year clearing grounds.
Do you have trouble securing rights of way from fear of damage to trees.
Have you figured cost as compared to merits.
Are you and your subscribers always happy.
The Cutter Glass Tree Insulator is the "Joker" that does it all.

Satisfaction is Pacification

Write for Prices and Estimates

SCOTT C. CUTTER

OSWEGO, ILLINOIS U. S. A.

A Clean and Complete Stock and a Satisfactory Way of Doing Business

These have Helped to Make Us Friends Amongst the Telephone Trade Everywhere.

High grade Telephones and a large line of Construction Materials and Supplies, including Cross Arms, Locust Pins, Oak Brackets, B. B. Galvanized Wire, Glass Insulators, Wire Connectors, Cross Arm Braces, Bolts, etc., etc., always carried in stock.

COURTEOUS TREATMENT. LOWEST PRICES. PROMPT DELIVERY.

Not a mere matter of phraseology, but sober, dependable facts. Try us.

DOUBLEDAY-HILL ELECTRIC CO. PITTSBURG, PA.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

CONVENTION HEADLINERS

The V-B Common Battery Ballast Switchboard

The only common battery switchboard successfully operated without relays. The ballast does it.

The V-B- Adjustable Ringer

The only ringer in which all adjustments are accomplished by the use of only a screw driver. No wrenches.

The V-B Plunger Inter-Communicating Telephone

No plugs. No cords. Ideal private branch exchange. Neat, compact and absolutely reliable.

The V-B Express Drop and Jack

Self-contained. Individually mounted. Permanent core. Removable spool. Self-closing jack. Self-restoring clearing out drop.

The Pendent Telephone

Steel piano wire cord. Talking and ringing circuit same as our wall instruments. The favorite office telephone. Popular for residences.

We Hope to Meet You at the Convention **Auditorium Hotel, Parlor 134**

The Vote-Berger Company

Makers of First-Award
TELEPHONES AND SWITCHBOARDS

La Crosse, Wis., U. S. A.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Aerial or Underground

Moon Cable Appliances

All Self-Soldering Nozzles—No "Wipe-Joints"

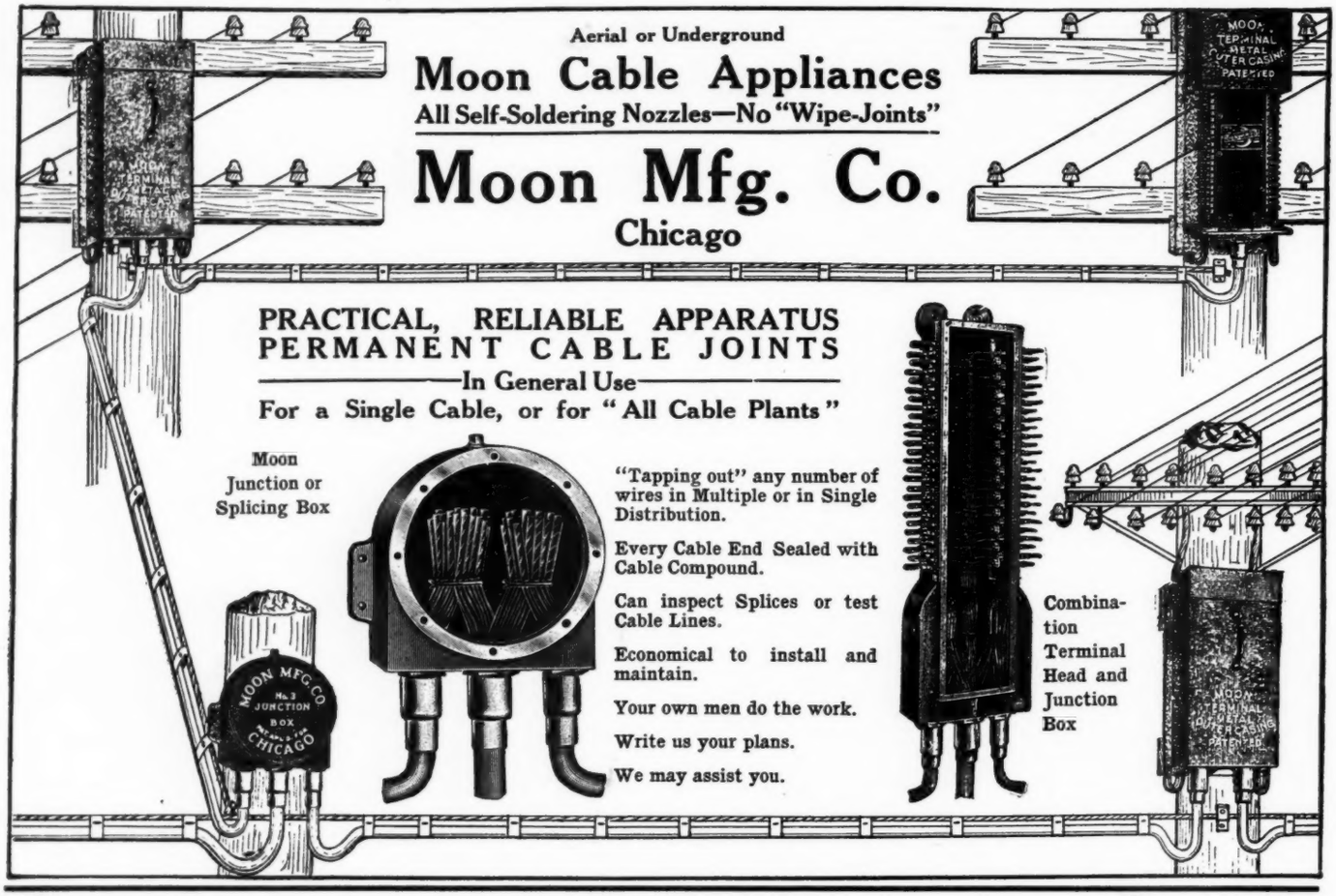
Moon Mfg. Co.

Chicago

PRACTICAL, RELIABLE APPARATUS
PERMANENT CABLE JOINTS

In General Use

For a Single Cable, or for "All Cable Plants"



Moon Junction or Splicing Box

"Tapping out" any number of wires in Multiple or in Single Distribution.

Every Cable End Sealed with Cable Compound.

Can inspect Splices or test Cable Lines.

Economical to install and maintain.

Your own men do the work.

Write us your plans.

We may assist you.

Combination Terminal Head and Junction Box

Saves cable, time, material

All sizes for all kinds of cables

Single Eye Cable Grip

UNIVERSAL CABLE GRIPS

(Patents Pending)

HAVE YOU TRIED THEM YET? THEY NEVER SLIP
THEY NEVER INJURE THE SHEATHING THEY ARE INDISPENSABLE

Without one of each kind in your construction outfit, you are losing money daily by the old-fashioned method of handling cable. Satisfy yourself by trying these Grips in your cable work.

Write for Catalog and Price List

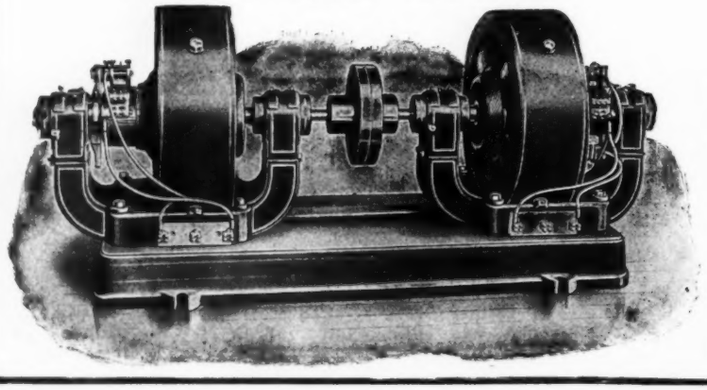
Double Eye Split Cable Grip

Double Eye Cable Grip

Universal Cable Grip Company, Inc.

P. O. Box 390 SYRACUSE, NEW YORK

IF IT'S A "ROTH," IT'S RIGHT



Roth Bros. Twin Motor-Dynamos

They guarantee satisfaction wherever used for charging Storage Batteries, for Ringing Telephone Call Bells, for Working Telegraph Lines, Working Signals, Magnetizing Coils in Machinery, Electrotyping, Electro-plating and Electro-metallurgy.

Roth Motor-Dynamos run on direct or alternating current circuits; made in special forms and for different purposes.

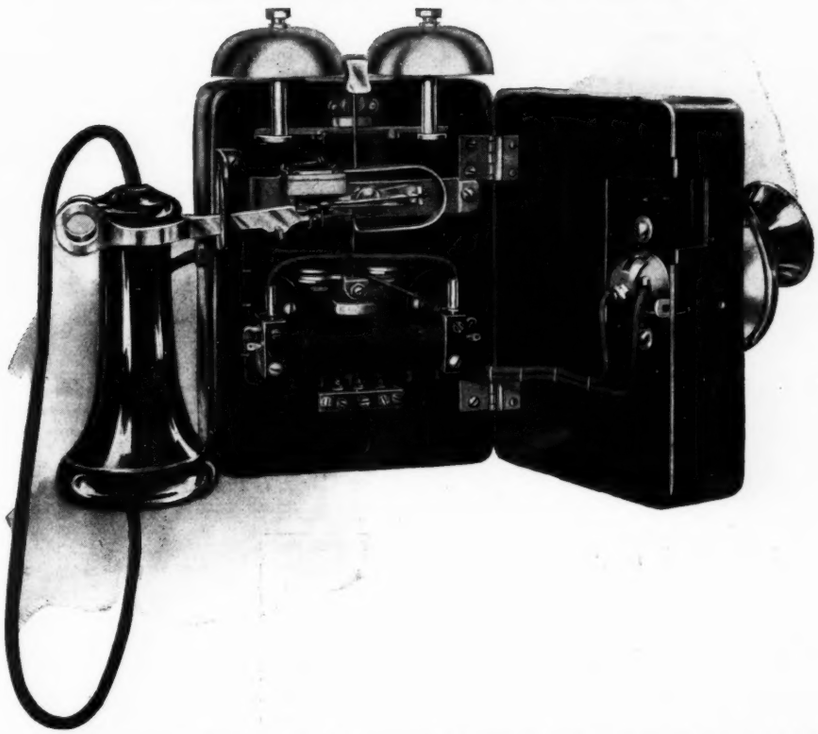
All Roth Twin Motor-Dynamos guaranteed to be perfect, both electrically and mechanically.

SEND FOR BULLETIN No 147

ROTH BROS. & CO., Chicago

DEAN TELEPHONE APPARATUS

Metal Box Common Battery Wall TELEPHONES



The accompanying illustration shows the most substantial and practical metal box telephone ever devised, which is being largely adopted for all kinds of exchange service, in fact many telephone companies are using it exclusively for their regular wall instrument. The retaining case is made from heavy sheet steel, drawn into shape without seams and finished with a tough enamel in any desired color, black being the standard.

For full description write, call or telephone for folder No. 3-B.

BRANCH SALE OFFICES:

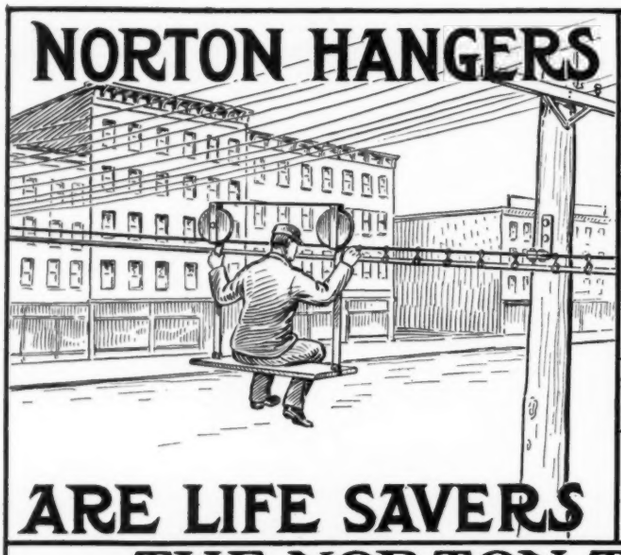
511 Kansas City Life Bldg., Kansas City, Mo. 542 Byrne Bldg., Los Angeles, Cal.

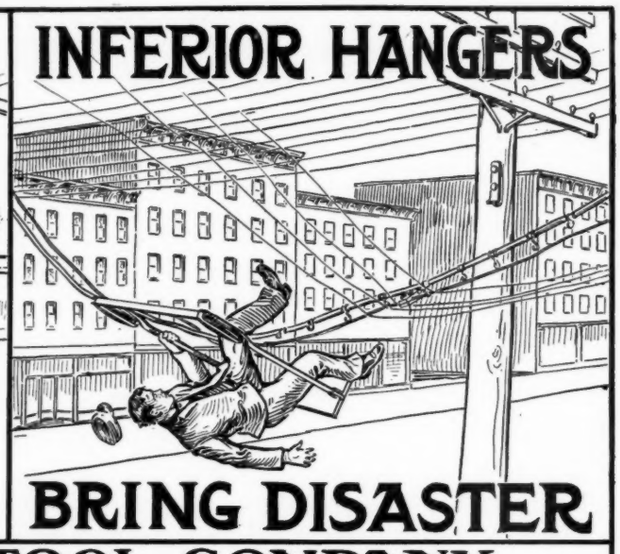
Factory and General Office: ELYRIA, OHIO

THE DEAN ELECTRIC COMPANY

ELYRIA · OHIO

Please tell the Advertiser you saw his Announcement in TELEPHONY.





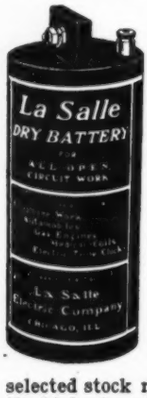
THE NORTON TOOL COMPANY
ELECTRICAL DEPARTMENT WEST PARK, OHIO.

La Salle Battery Co.

Manufacturers of

DRY BATTERIES

47 W. Lake Street - CHICAGO



We are manufacturing the BEST dry battery on the market. This is a strong statement, but the batteries we are turning out day after day prove it. Twenty-eight years in the Telephone and Battery business have enabled us to produce this satisfactory result. We manufacture batteries of low, medium and high amperage, as required by the trade.

Telephone and Electric Bell Batteries should register from 8 to 12 amperes.

Gas Engine Batteries should register from 14 to 16 amperes.

Automobile Batteries should register from 15 to 22 amperes.

It is a mistake to think that the batteries for every class of work should have the same amperage. Our batteries will stand every strain required of them. The materials are of the best selected stock made and the workmanship of the battery is of the highest grade. There is no better battery made at any price than the "La Salle." A difference of 1c or 2c on the original cost of a battery is not to be considered as compared with the lasting qualities.

Therefore do not buy a battery just because it is cheap. We make two sizes: 2½x6" and 3¾x8". If you specify what you are going to use the battery for, we will be able to furnish you a satisfactory battery at the lowest price that it can be made for. We make yearly contracts upon favorable terms, and if you will try a barrel lot, you will find that the "La Salle Battery" is the one you have been looking for.

LA SALLE BATTERY CO.

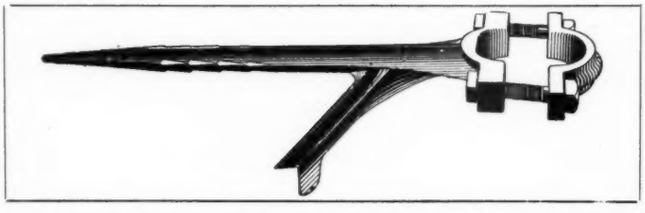
N. B.—Do not fail to specify the class of service you wish to use the battery for, in ordering. Ask for prices.

A REDUCTION THAT MEANS SOMETHING

We have made **NOVELTY POTHEADS** so cheap that it is both wisdom and economy to discard the old style sleeves. Not even expert lead-wipers can compete. Any ordinary man can install our **NOVELTY POTHEADS** with his own tools.

We also make sleeves for straightaway and two and three branch sleeves. The price—not the quality has been lowered.

Write immediately for catalog 199.



Our **SECURITY POTHEAD BRACKET** is malleable iron and linemen may stand upon it without danger. Can this be done with the old wooden block bolted or tacked to the pole?

Can you buy the old style for 50 cents each, which is our new price for these strong, practical, everlasting iron brackets? In making comparisons remember the labor saved and the freedom from vexatious breakdowns!

Write for Bulletin 189.

THE F. BISSELL COMPANY
TOLEDO, O.

TOLEDO, OHIO · TRADE MARK · THE F. BISSELL COMPANY

Please tell the Advertiser you saw his Announcement in TELEPHONY.

WASHINGTON FIR I·E·C CROSS ARM

A specialty is an article selected with especial care and especial reference to a given end by a firm or individual especially qualified for that purpose. Washington Fir Cross Arms are one of our specialties.
The Diamond Brand.

We selected the Washington Fir Cross Arms because we found them *superior* for telephone and telegraph purposes. They are doubly inspected and are employed exclusively by the Western Union and Postal Telegraph Companies. Nearly all of the other large cross arm consumers of the U. S. use them.
Get The Diamond Brand.

I·E·C

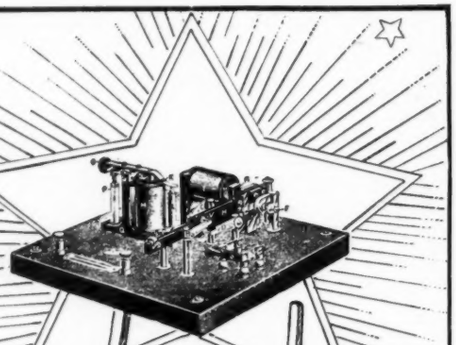
We carry complete stocks at Minnesota Transfer and Chicago and can fill all orders promptly. Have been doing an immense business with this line and every customer satisfied. Full carload orders shipped direct from mills at Walville, Wash. The Diamond Brand.

We are specialists in other good things for the telephone trade. If you have'nt already done so, get our catalogue, try our house and see if specializing does'nt pay. A trial order of Washington Fir Cross Arms --- The Diamond Brand --- will convince you. Quotations promptly furnished on anything you need.

ILLINOIS·ELEC. CO. I·E·C CHICAGO, U. S. A.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

THE WARNER POLE CHANGER STANDS HIGH



9TH YR. What's Your Guess?

8TH YR. 9000 in use. More Popular than ever.

7TH YR. 7500 in use. A Perfect Landslide

6TH YR. 6000 in use. Everybody getting them.

5TH YR. 4700 in use. Take my Wife — Leave my "Warner."

4TH YR. 3200 in use "Tickled to death."

3RD YR. 1500 in use. customers still satisfied.

2ND YR. 750 in use. customers satisfied.

1ST YR. 250 sold sent on trial.

IF YOU HAVE A WARNER YOU KNOW YOUR RIGHT

AVOID IMITATIONS

WRITE FOR OUR CATALOGUE.

WARNER ELECTRIC CO.

Factories: { MUNCIE, IND., U.S.A. WINDSOR, ONT., CANADA

General Offices. MUNCIE, IND., U.S.A.

Sound Proof Booths

Nothing Better Made

Send for Catalogue and Prices

Immediate attention given all inquiries and orders

We also manufacture bank, office and store fixtures.

Fisher-Stevens Co., CHARLES CITY, IOWA.

You are not taking any chances when you order the original

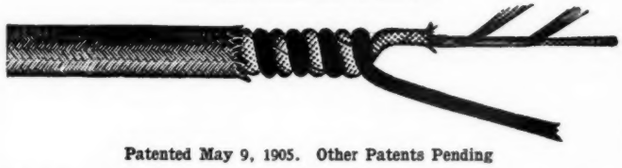
PREMIER "BB"

TRADE-MARK REGISTERED

SWITCHBOARD CORDS

We make them to stand hard usage and to last.

Cut shows construction of this cord



Patented May 9, 1905. Other Patents Pending

This is the same cord formerly made by THE McDERMID MFG. CO.

Unequalled for Quality. Right Prices. Prompt Shipments.

If you have never tried this cord write us concerning our trial offer

Premier Electric Company

CORD MANUFACTURERS

Jackson Blvd. and Desplaines Street :: CHICAGO

Please tell the Advertiser you saw his Announcement in TELEPHONY.

J. E. SCHWARTZ W. P. STEWART

Schwartz & Stewart
WHOLESALE & RETAIL HARDWARE

Natchez, Miss. Jan. 21st. Feb. 3/06.

Electric Appliance Co.
Chicago.

Gentlemen:-

It gives us pleasure to be able to say that the telephones purchased from you have never given us the least trouble.

Some of them were sent into the country, and were put up by persons with absolutely no previous experience, and with nothing to guide them but our diagrams and written instructions, and yet not a single set has failed to give satisfaction.

Except for interior use, we have recommended the Eaco 36 Wall telephone, and have sold practically only that pattern.

As to the working of the switchboard, the best evidence of its merit is to be found in the fact that we never hear from it unless a new drop and phone are needed,

Very truly yours,

Schwartz & Stewart.

No Difference In their Opinions

QUALITY IS WHAT DOES IT

Hattonville Ind. February 1-1906
Electric Appliance Company
Chicago Ills.

Gentlemen:-

On our rural lines of over 200 phones, of six different kinds, we have quite a number of your Eaco Telephones, which have given entire satisfaction. No complaint comes to us concerning the service of an Eaco phone and all other supplies purchased of you have been satisfactory

Yours Truly
H. H. Brim
Exp. Pres. & Mgr.
Union Home Tel. Co.

SEND FOR OUR FREE BOOKLETS

They Contain Valuable Information

YOURS FOR THE ASKING

"EACO" No. 36 X. P. Bridging Rural Line Phone.

Our Telephones Are Built For Both Series and Bridging Lines

SIMPLICITY
EFFICIENCY
QUALITY

Make them Leaders

GENEVA TELEPHONE COMPANY.

Geneva, Ind. Jan 25 1906

Electric Appliance Co
Chicago Ill

We have been using your Eaco Telephones and other equipments for the past two years. They have given us the best of service. We are well pleased with every apparatus we have of yours.

Yours Truly
Geneva Telephone Co

Electric Appliance Company

Chicago, Ill.

Branches

San Francisco Dallas
New Orleans

J. E. GILROY J. T. GILROY

GILROY BROTHERS
General Merchandise

Lost Nation, Iowa, Jan. 24-06.

Electric Appliance Co.
Chicago.

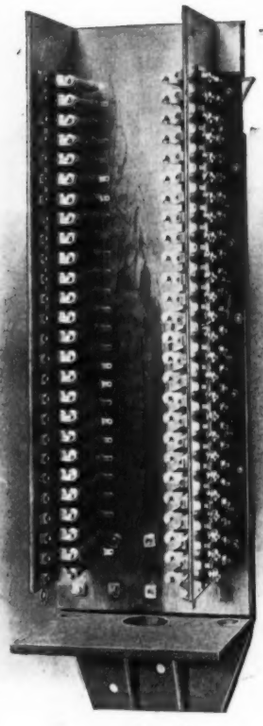
Gentlemen: After 10 years of installing and using your telephones, we feel it unnecessary to look further for a good 'phone.

We are using your little No. Seven 'phones (long since discontinued by you) and find it working well on distance of fifty miles or more through switchboards and other lines.

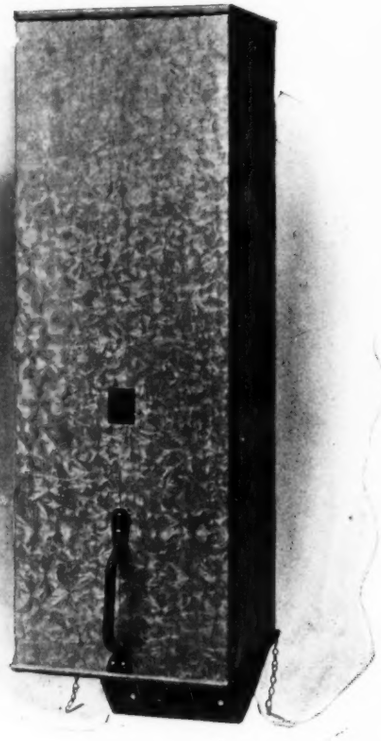
Hoping you will continue to give us as good service in the future as you have in the past, we are,
Yours,

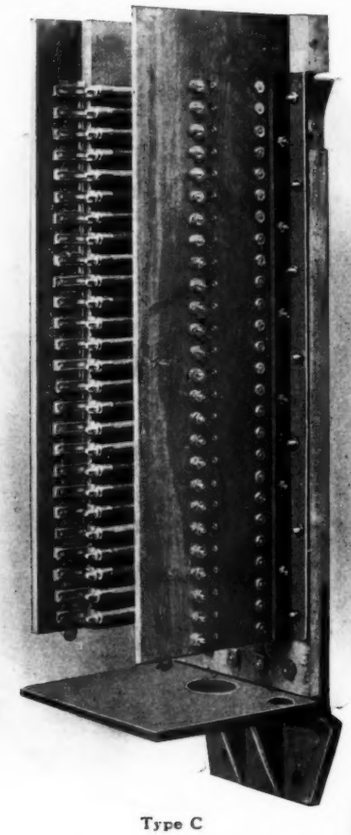
Gilroy Boys.

J G



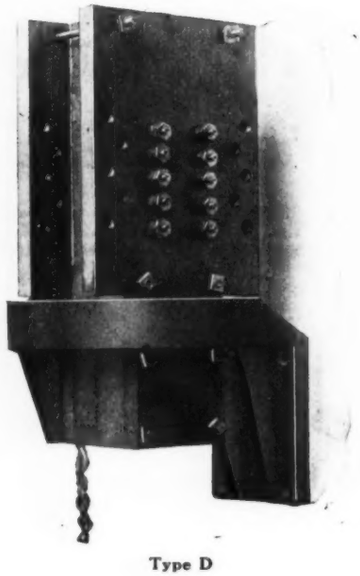
Type B



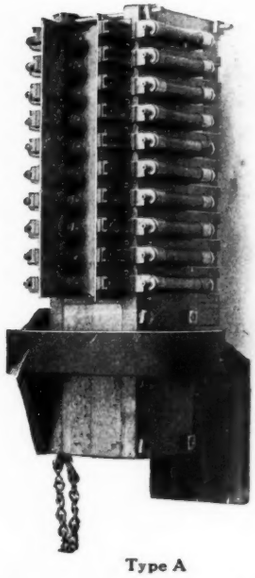


Type C

American Can Top Terminals Are Standard
All Sizes—All Types—See Them AT THE Convention



Type D



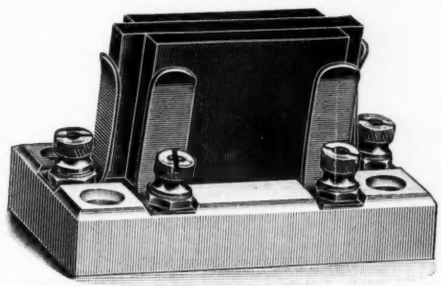
Type A

American Electric Fuse Co.

NEW YORK MUSKEGON, MICH. ATLANTA

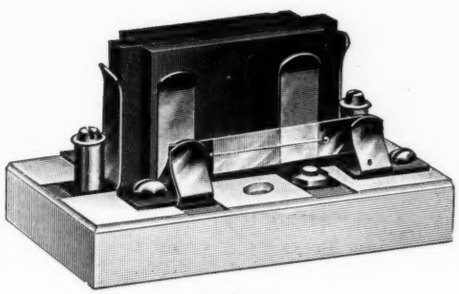
Fuse Blocks and Lighting Arresters

IN USE
ALL THE TIME
BY
All Telephone Men



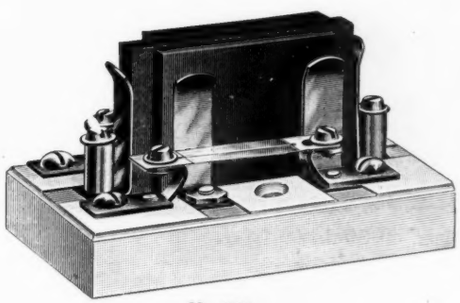
No. 404

ON EXHIBITION
Room 628 Auditorium
June 26-27-28



No. 401

Just a Few
Standard Blocks
FOR
Everyday Use



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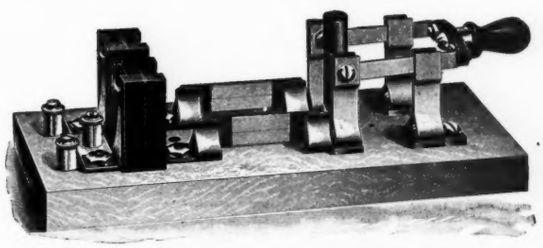

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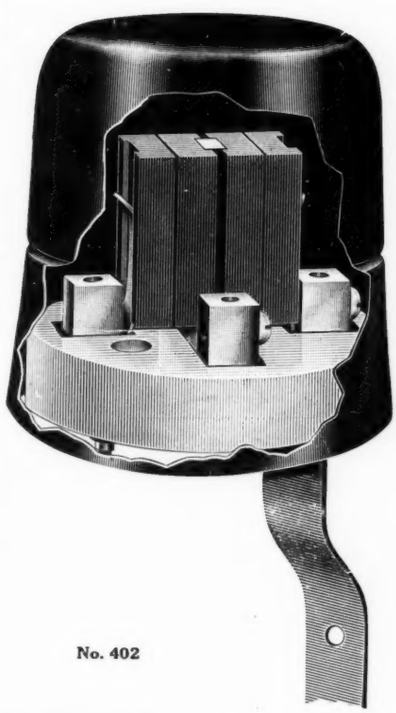
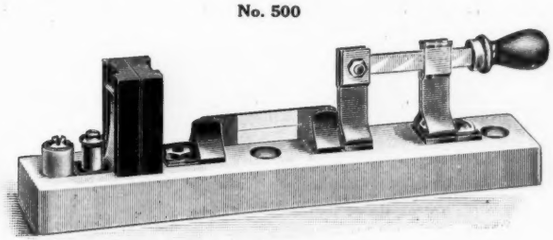


No. 402

In Ordering
from your
Jobber
always specify
American



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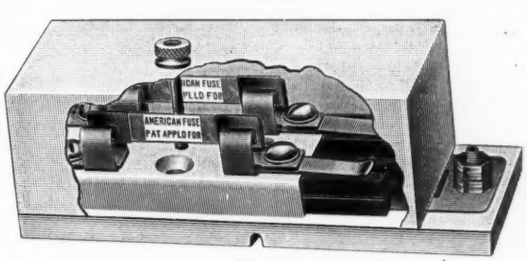


No. 85

American Electric Fuse Co.

NEW YORK MUSKEGON, MICH. ATLANTA

Please tell the Advertiser you saw his Announcement in TELEPHONY.

2 SUCCESSFUL "STANDARD" SPECIALTIES 2

For the benefit of numerous inquirers, we desire to state that these devices have been proven wholly satisfactory in every respect and that the validity of their patents has never been in question.

We not only guarantee you satisfactory service but insure freedom from any patent litigation.

The Standard Pole Changer and The Standard Duplex Set are both of the very highest standard.

Order either or both; sent on 30 days' trial, without obligation.

The Standard Pole Changer

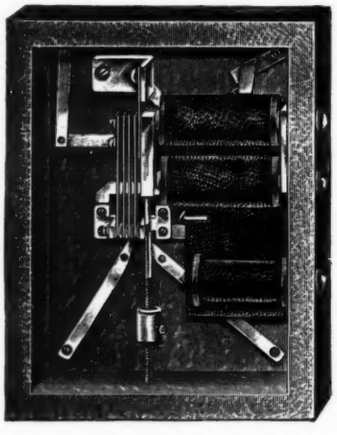
Absolutely Guaranteed

Simple, efficient, economical. Only one battery of forty to fifty ordinary dry cells required. Works perfectly on all alternating and direct pulsating current ringing.

Sent on 30 days' trial.

Present price, only $15.00

SEND US YOUR ORDER.



The Standard Duplex Set

Another Money Maker

By using this instrument you can carry on two conversations over any single metallic bridging line without either conversation interfering with the other.

Sent on 30 days' trial.
Let us explain it to you.

Price complete, per set, $15

WE TAKE ALL CHANCES.

CURRENT ELECTRIC COMPANY, 52 State St., CHICAGO

THIS IS THE CHAIR THEY TALK ABOUT!

It Makes Your Operators Pleasant and Your Subscribers Satisfied. Isn't It Worth Investigating?

No. 4½S. The Ideal Operator's Chair.

No. 5. The Ideal Chief Operator's or Toll Board Chair.

Operators don't know they have a back when they use a **RICHARDS FIT-THE-BACK CHAIR—the only chair that gives absolute comfort.** The chairs illustrated are different from any chairs you ever sat in. The back is pivoted and fitted with stiff springs so that it adjusts itself to any position assumed by the occupant within the limits of its travel, thus assuring continuous, comfortable support for the back and lower limbs.

We want every telephone manager or purchasing agent to know all about this chair. Write today or call and see us while at the Convention.

THE RICHARDS PIVOTAL FIT-THE-BACK OPERATOR'S CHAIR
or any other of our line of office chairs will be sent free for inspection before a charge is made.

Richards Chair Panel Company

1103-8 Woman's Temple :: :: :: CHICAGO, U. S. A.

The Signal for this Telephone is ONE RING
FIVE CENTS TOLL
The Bell Telephone Company of Canada
The Signal FOR THIS BELL
The Citizens Tel. Co.
The Signal for this Telephone is FIVE RINGS
ANSWER ONLY
TELEPHONE No.
WARREN & MILES TELEPHONE CO.
LONG DISTANCE
IN TALKING
LONG DISTANCE

Mr. Busyman:

DID IT EVER OCCUR TO YOU

when you note the stacks of good advertising matter which accumulate in your office or go into your waste basket, unread or at best hastily glanced over because you are so busy

That Your Printed Matter

on which you spend so much time and thought and money

Goes Into the Waste Basket

of the man you want to sell because he is just as busy as you?

For Telephones: Meter Scales, Name Plates, Direction Cards, Rate Cards, Switchboard Numbers, Etc.

Metal Tape Measure, Celluloid Picture Front

Celluloid Paper Weight.

There is no way you can get your name, your business so persistently, directly and forcibly before a man as in the form of some useful article, which he can use on his desk or carry in his pocket every day in the year.

We make a line of advertising novelties so useful, so attractive, that when you hand them out you can be absolutely certain that your customer not only keeps and reads your ad but he will actually feel grateful—glad to get it.

Prices and Samples on Request.

Match Boxes
Tape Measures
Mirrors
Celluloid Rules
Calendars
Clocks
Wall Match Holders
Medallion Signs
Paper Weights
Postal Cards
Buttons—All Kinds
Pencil Holders
Erasers
Dice Boxes
Fortune Tellers
7 Come 11
Pocket Roulette
Time Indicators
Perpetual Pocket Calendars with Mirror Backs
Wall Hangers
Celluloid Tooth Picks
Napkin Rings
Pin Holders
Blotters
Book Marks
Celluloid Trays
Paper Clips
Watch Fobs
Salt and Pepper Sets
Hair Receptacles
Etc., Etc., Etc.

ALSO

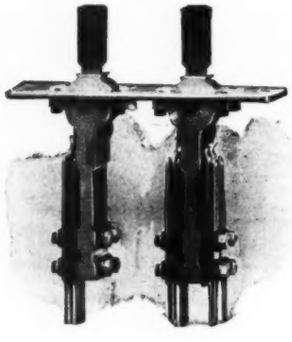
Badges and Metal Buttons for Conventions-Souvenirs.

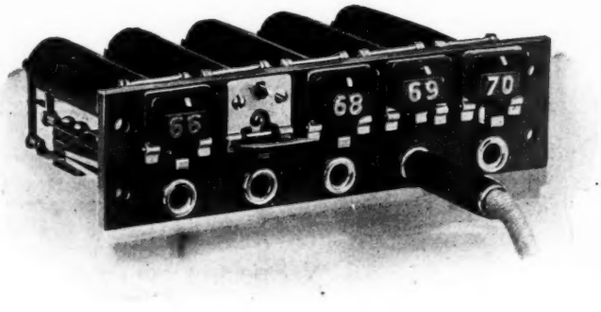
Cruver Mfg. Company

464-468 Carroll Ave. :: CHICAGO, U. S. A.

MONARCH

THE two most important parts of the switchboard being the line signal and the ringing and listening key, we illustrate a strip of Monarch drops and jacks and a Monarch ringing and listening key with ring back. These parts have now been on the market for a period of two years and during that time they have proven themselves to be most efficient and durable. The fact that the armature of the drop is mounted in front of the coil and that the coil can be removed without breaking any soldered connections and without disturbing the armature is a feature that is appreciated by all practical telephone men. The additional advantage secured from this construction is that the adjustment of the armature is positive and permanent.





The ringing and listening key shows the same careful consideration of small details which is so apparent in all Monarch equipment. The mountings for the springs are solid brass so formed as to afford a most substantial support. The springs themselves are made of german silver and the contacts are pure platinum rivets. Little features of this kind will interest anyone in the market for switchboard equipment and an investigation will pay.

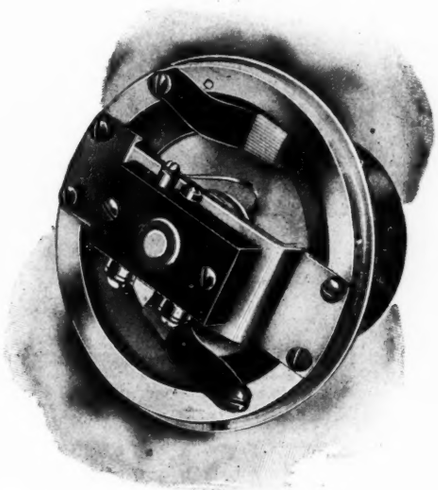
A complete exhibit of Monarch Telephones and Switchboards will be found in Rooms 642 and 644 during the National Interstate Telephone Association Convention, June 26th, 27th and 28th.

Monarch Telephone Mfg. Co.
CHICAGO, U.S.A.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

MONARCH

THE reputation of Monarch transmitters and receivers has been secured by five years of successful operation. The transmitter not only excels in talking qualities, but has the additional advantage of being cheap to operate. Accurate and expensive tests show that the Monarch transmitter can be operated on one-half the amount of current required to satisfactorily operate other makes. This feature is certainly a valuable one.

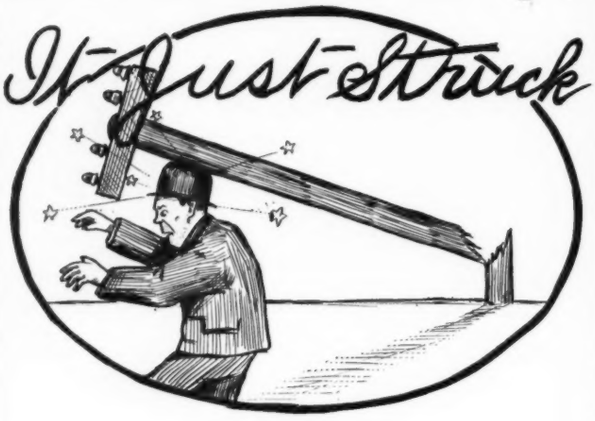


The construction of the Monarch receiver is such that satisfactory results are a natural consequence. It is a well made receiver, worthy to be the companion piece of the Monarch transmitter. The mounting of the coils is a unique feature and one which is appreciated, as either or both coils can be readily removed, repaired or interchanged.

A complete exhibit of Monarch Telephones and Switchboards will be found in Rooms 642 and 644 during the National Interstate Telephone Association Connention, June 27th and 28th.

Monarch Telephone Mfg. Co.
CHICAGO, U.S.A.

Please tell the Advertiser you saw his Announcement in TELEPHONY.



us that you ought to know some of the advantages of the

Noble Common Battery Lockout System

HERE ARE A FEW

It is full metallic; needs no ground, additional switchboard wiring or any attention from the operator, as it is positively automatic in its action.

Does not cut down transmission. It is a clean-cut, neat appearing device; scientifically devised by practical men to withstand the rough usage of inexperienced persons, and is guaranteed to give an ideal party-line service, which makes this service equal to a single line.

The subscriber does not have to touch it.

The Noble Automatic Lockout Is a Marvel of Simplicity

All well informed telephone men realize that measured service is the coming system.

Our Coin Collector Beats the World

and especially the "dead-head" who don't want to pay for his telephone service. It is a simple device for common battery work.

You Can't Knock It Out

Delegates to the National Inter-State Convention are invited to inspect our apparatus in actual operation, one block north and half block west of Michigan Avenue entrance to Auditorium Hotel.

The Johnson Electrical Mfg. Co.
Suite 410, No. 26 E. Van Buren St., CHICAGO

Gould

Announcement

We have recently organized a Telephone Battery Department and have engaged a corps of experienced engineers who will devote their entire attention to the Storage Battery as applied to Telephone work.

We will be pleased to investigate your conditions and submit a detailed report and estimate on the cost and advantages of installing a Storage Battery to do your work.

All inquiries will have our careful attention.

Gould Storage Battery Co.

SALES OFFICES:
CHICAGO: Rookery Bldg.
BOSTON: 89 State St.
SAN FRANCISCO 1701 Geary St.

MAIN OFFICE:
NEW YORK: 1 West 34th St.
WORKS:
DEPEW, N. Y.

Do You Want to Know WHY

You should treat every pole and cross-arm of your system with

"ANTISEPTINE?"

BECAUSE

it's application will prolong their life at least 100% at small expense.

Put up in barrels. Always ready for use.
Easy of application.
No heating required.

A postal card will bring you valuable information.

AMERICAN WOOD PRESERVING COMPANY
Incorporated 1892
SOLE MFRS. OF

"ANTISEPTINE"

Trade-Mark

3667 No. Clark St. **CHICAGO**

EUREKA
THE BEST

YOU

Are cordially invited to make yourself

AT HOME

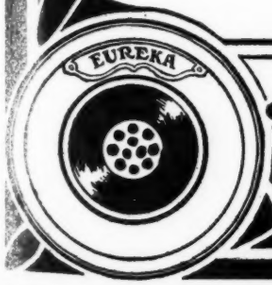
at our headquarters

Room No. 138, Parlor Floor, Auditorium Hotel

June 26, 27 and 28

We wish to get better acquainted with you and
we want to show you some of the
best telephone apparatus
ever produced

Our new Telephone Catalogue just out, free on application



·EUREKA·ELECTRIC·CO·
·GENOA·ILL·U·S·A·

FAULTLESS INSULATING COMPOUND

"TRUE TO NAME"

SPECIALLY ADAPTED FOR

Pot Heads, Terminals, Cable Splicing, Etc.

Best results are obtainable by its use

MANUFACTURED BY

The Faultless Insulating Compound Co.

Factory, Chicago . . Office, 53 River Street, CHICAGO

Telephone, 1386 Central

TELEPHONE CONSTRUCTION MATERIAL

IF YOU WANT

Prompt Shipments and Good Goods At Lowest Prices Try The

TELEPHONE SUPPLIES

WE HAVE IN STOCK EVERYTHING ELECTRICAL

MONARCH ELECTRIC & WIRE CO.

125-127 S. CLINTON ST.

CHICAGO

WHAT YOU CAN'T GET FROM US IS HARD TO FIND ANYWHERE

TRY THE MONARCH DRY CELL IT'S A WINNER

THINK IT OVER THEN WRITE US FOR PRICES

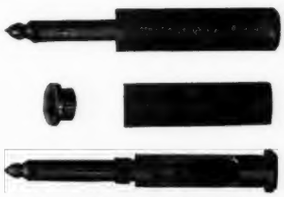
WEATHER PROOF IRON & COPPER WIRE AND GALVANIZED STRAND

Please tell the Advertiser you saw his Announcement in TELEPHONY.

A PYRAMID OF NEW THINGS

THE PIONEER INDEPENDENT TELEPHONE FACTORY ESTABLISHED 1893

Thoroughly and Practically Tested



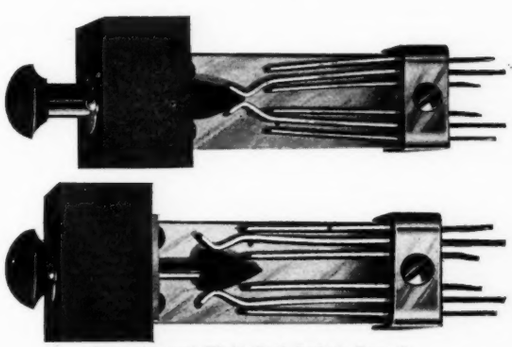
Loose Sleeve Plug Type E.

Efficient Durable Guaranteed

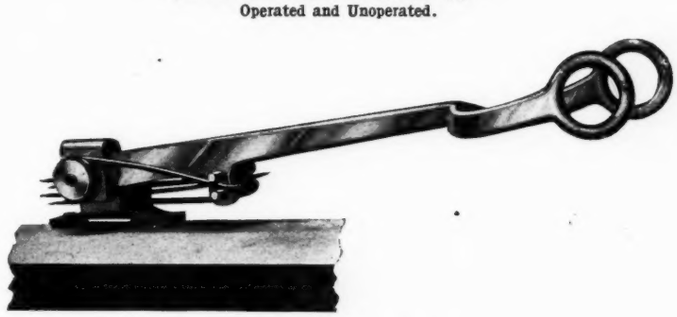
Type "E" PLUG

is made from solid brass rod drilled and turned to the proper size. The tip is a solid piece of brass passing through the center of the plug to the connecting chamber and the insulation from the sleeve of the plug is of pure hard rubber. The cord is fastened to the sleeve side by screwing into the plug, and the tip connection is made under a screw and washer. This insures a fastening of cord and plug, which keeps the strain off the contacts and prevents the cord from being pulled out of the plug. A loose rubber or fibre sleeve covers the connecting chamber, and turns very readily on the plug, thus preventing the operator from twisting the cord and breaking the conductors. Mechanically this is one of the strongest plugs on the market and it is electrically correct.

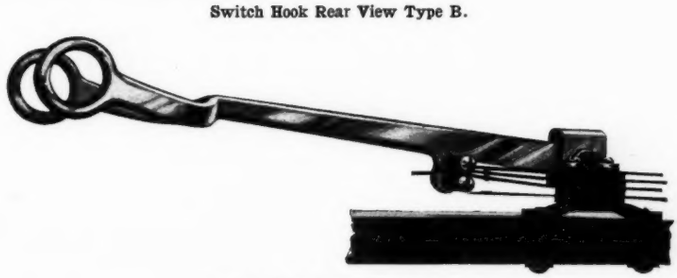
Induction Coil Type C.



Generator and Night Bell Switch Type F Operated and Unoperated.



Switch Hook Rear View Type B.



Switch Hook Front View Type B.

Type "B" Switch Hook

The frame upon which this hook is mounted is made from heavy sheet brass. The lever is made of two pieces of heavy sheet steel riveted together before it is drilled and prepared for mounting. This insures accuracy of assembling, and makes a hook that is more substantial and neater in appearance than a cast hook. The contact springs are made of German silver of the right length and gauge and grade to insure an ample make and break, and all insulations are of pure hard rubber and the action of the hook does not depend upon the contact spring, but upon a main spring, shown in the rear view of the switch hook. The Type "B" Hook is simple in construction and positive in its action and is substantial and guaranteed to give satisfactory service.

Western Telephone Manufacturing Co.

The Pioneer Independent Telephone Factory.

Established 1893

59 W. Jackson Boulevard, CHICAGO

You Can Reduce Your Maintenance Expense!

HOW?

By installing in your Exchange a Dry Battery that will last one-third longer than the one you are now using.

The Independent Battery

contains more active element than any telephone battery on the market and hence has the longest life. Our materials are imported and the best obtainable. That THIS Battery is not an experiment, but a demonstrated fact, is shown by testimonials from hundreds of satisfied users.

Write for Price.

Independent Dry Battery Co.
Station O CHICAGO, ILL.

Ring Thru Condensers For Bridging Telephone Lines

Have You Tried Them?

This condenser is used so that any telephone can be called on bridging lines, even if all of the receivers are off the hook.

Write us for further details.

KEYSTONE ELECTRIC TELEPHONE CO.
822 FIFTH AVENUE PITTSBURG, PA.

Measured Service

Increases Your Earnings

Size 4¼ x 2¾ x 2 inches

Described in our January bulletin. Write for it.

NOTICE

¶ On September 5, 1905, the United States Patent Office issued to Oscar M. Leich the dominating patent on Selective Four-Party Telephone Ringing Systems, covering all present practical forms of high and low frequency systems, together with all so-called harmonic or different frequency arrangements.

¶ Our Patent No. 799,010 covers all reactive means such as condensers of varied capacity, impedance coils, etc., for operating Selective Ringers whether adjusted (tuned) or not, and no merely adjusted (tuned) ringer can be operated in practice without employing some kind of reactive means such as above described, and the mere addition of weight, adjusted (tuned) springs or the like, does not evade the claims of our broad patent.

American Electric Telephone Company
CHICAGO

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Burns Adjustable Telephone

Notice This!

SURELY YOU NEED IT

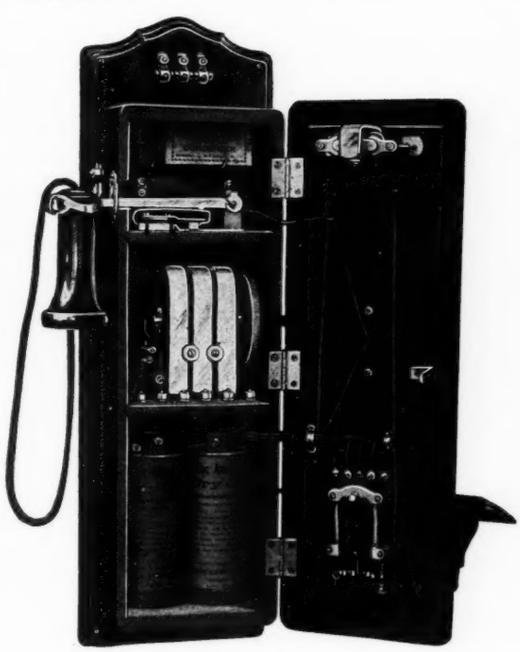
Saves Your Desk Sets

State whether you need these for flat or roll top desks.

AMERICAN

ZABEL 8 PARTY

TELEPHONES



Selective Ringing

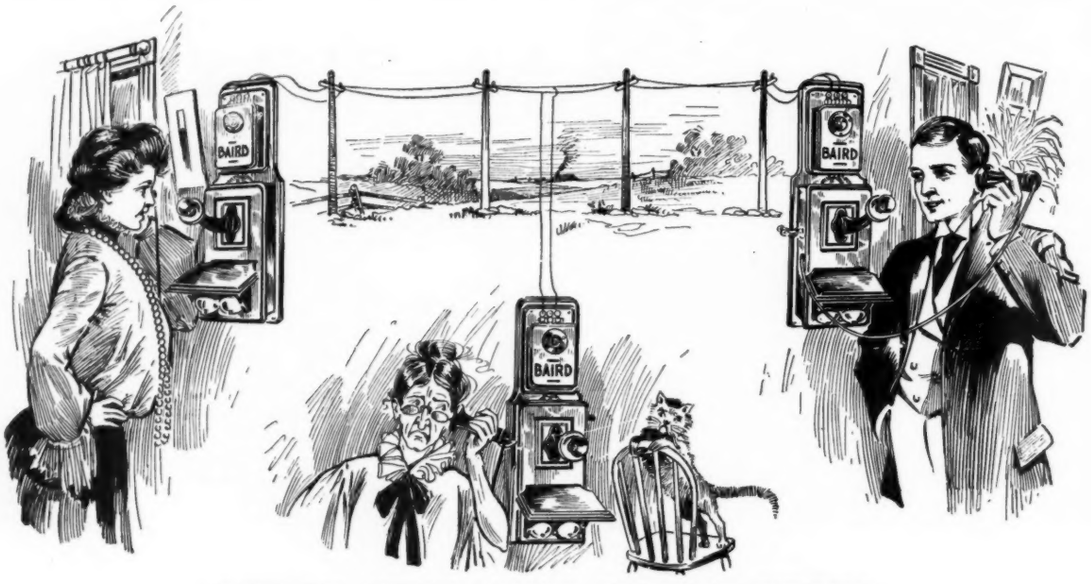
This System has now proven its serviceability in actual practice

WRITE US FOR PRICES AND INFORMATION

American Electric Telephone Co.

State and 64th Streets, Chicago

Please tell the Advertiser you saw his Announcement in TELEPHONY.



LET US STOP YOUR RUBBER-NECKS

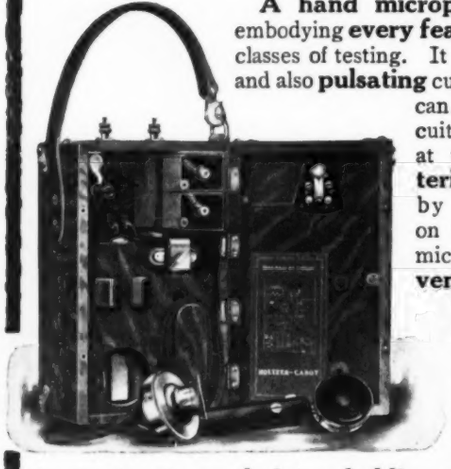
WRITE FOR THE BOOKLET.

Improved transmission, Long distance revenues, Increased rentals, Reduced maintenance expense, Greater capacity of operators, Satisfied subscribers, General comfort—all come with the

Baird Secret Service System.

BAIRD MANUFACTURING CO., 1503 Briar Place, CHICAGO

Lineman's "Universal" Testing Set



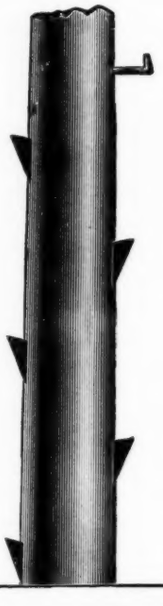
A hand microphone testing set embodying **every feature** needed for all classes of testing. It has **alternating**, and also **pulsating** current. **The ringer** can be **thrown in** circuit or **shunted out** at will. **The batteries** are controlled by a push button on the handle of the microphone, **thus preventing their exhaustion.** The door opens by a push button and is held closed by an automatic catch—one hand can do the trick. The hand microphone **obviates holding up a heavy box to talk into as in ordinary sets.**

Truly a **"Universal"** set. Send for bulletin and price sheet 205.

The Holtzer-Cabot Electric Co.

395-97 Dearborn Street, Chicago.

FACTORY: BROOKLINE, MASS.



The Strength of Our Pole Steps Mean Safety to Your Men

Galvanized or wood kept in stock for quick shipments. Very low prices. Write to-day.

THE F. BISSELL COMPANY

TOLEDO, O.

D. BAUMFLEK & CO. **Telephone 2811 Douglas**

TELEPHONE CONTRACTORS

Line Construction Work a Specialty
Telephone and Electrical Installations

Personal supervision given all work. Prevent loss of time and material. Insure superior workmanship. Protect from strikes and other labor troubles. Effect savings of from 25 to 50 per cent.

3737 Vincennes Avenue - - - Chicago

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Write for Catalogue of the Illinois and Sandwich Duplexers That Duplex

Do You Get Our Rings?

If Not! There'll Come a Time

WHEN YOU WILL

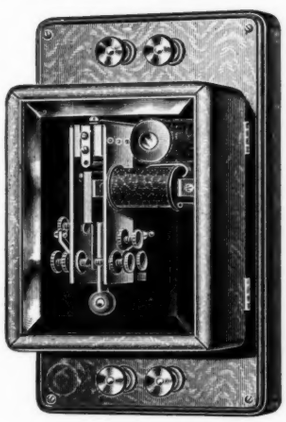
ORDER TO-DAY on 30 Days' Free Trial An Illinois Direct Reading Ohmmeter

The Sandwich Pole Changer

Is 10 Years ahead of all others. The Ringer Without an Equal

Buy the Sandwich

Your Dry Batteries will last at least 3 months longer operating a Sandwich Pole Changer than on any other Ringer, as shown by actual working test.



The Sandwich Pole Changer will ring your subscribers where all others fail. It cost from 40 to 50% less to operate than any other Ringer on the market.

Read What Others Say of the Sandwich Pole Changer

Gastonia, N. C., April 18, 1906.

Gentlemen:—October 16, 1905, we bought a Sandwich Pole Changer from you and it's OK. Doing good, heavy work day and night. We read your ad regarding Duplexers and Ohmmeters, and if they are as GOOD as your Pole Changer, we want them.

Why don't you get in line and order a Sandwich Ringer on 30 days' Free Trial. Admitted by users to be the best. Absolutely Guaranteed to you. : : : : :

We Are Back of All Our Products, and Will be to the End of Time

Try Our Duplexers that Duplex

The Sandwich Pole Changer Co.

100 Eddy Street

Sandwich - - - Illinois

Send for Catalogue of Ohmmeters The Great Trouble Finder

Please tell the Advertiser you saw his Announcement in TELEPHONY.

A THOUGHT FOR TO-DAY

and a reward for the buyer who secures our prices on his telephone and supply requirements

"If yu want tu klime a tree yu hev to begin at the bottom."— *Josh Billings*

This bit of philosophy certainly applies to the Telephone business as a whole and the manufacturing end in particular—We are not ashamed of the fact that we were "small potatoes" when we started, eleven years ago—but now—well, we can show you better values and a more prompt shipment of your average order than you can secure elsewhere, due to our enormous growth and ample stock.—We want your orders.

CONVENTION DELEGATES

NATIONAL INTER-STATE CONVENTION

AUDITORIUM—CHICAGO, JUNE 26 TO 28

BE SURE AND

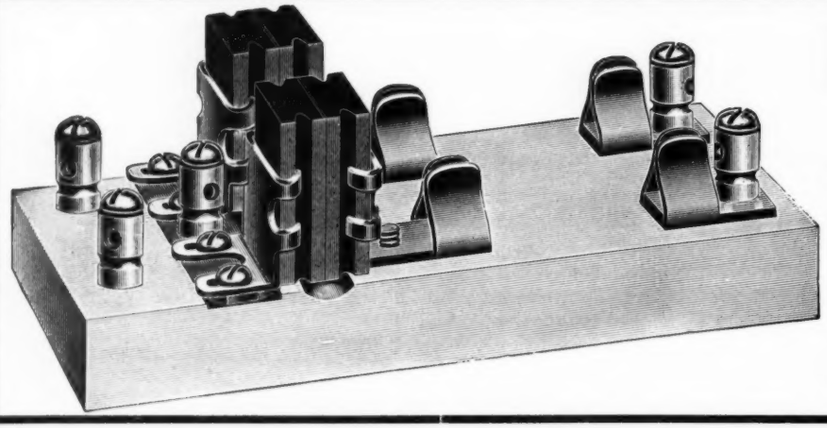
FOLLOW THE ARROW

TO OUR EXHIBIT ROOM 650

CENTRAL TELEPHONE AND ELECTRIC CO.

MAKERS OF HIGH GRADE TELEPHONE APPARATUS
DEALERS IN TELEPHONE SUPPLIES EXCLUSIVELY

2131-37 LUCAS AVENUE ST. LOUIS, U. S. A.



APPLETON'S NEW No. 601

LIGHTNING ARRESTER

This is "THE REAL GOODS."
Fully Warranted in Every Respect.

Made in W. U. or Postal style. No mica pieces. Packed, one in a box. Always equipped with "Veribest" fuses, unless otherwise specified. Open space between carbons give the entire carbon surface. Carbons adjustable from $\frac{1}{64}$ to $\frac{1}{16}$ inch. Not necessary to remove carbons. Simply insert a card between the carbons to remove any dust after lightning or strong current has passed through and line is clear.

For full information regarding these Lightning Arresters or any other articles of our make, including Fuse Wire, Fuses, Connectors, Fuse Blocks, Distributing Boards, etc.

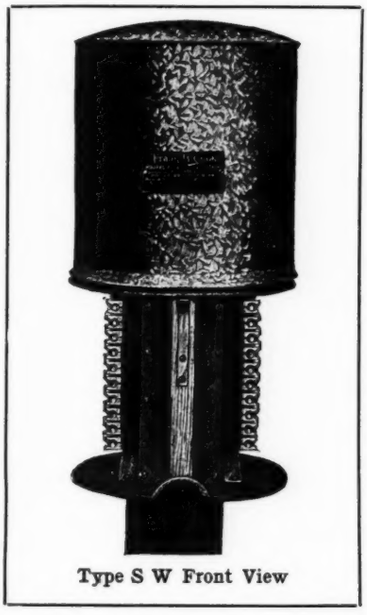
ADDRESS

APPLETON ELECTRIC COMPANY
224-226 Washington Street, CHICAGO
NEW YORK OFFICE, 227 Fulton Street

ASK FOR OUR NEW ELECTRICAL CATA-LOGUE
500 Illustrations Electrical Goods
ELECTRICAL SUPPLY HOUSE
NET PRICE LIST
No. 4 Telephone, each - 3.50
No. 2 Telephone, each - 7.00
No. 14 Telephone series, - 7.50
No. 7A " Bridging 10.50
Medical Coils - - - 1.50
Dry Batteries, Mesco .20
Dry Batteries, 1900, - .25
Vibrating Bell - - .25
No. 60 Telephone, each - 5.00
No. 5 Telephone, each - - 6.50
No. 16 Telephone Bridging 10.25
No. 13 " " 14.00
Telegraph Key - - - .75
Telegraph Sounder - - 1.50
Telegraph Sounder & Key 2.50
Motor and Fan - - 3.00
Improved Giant Sounder.
Steel Lever Key.
SEND FOR CATALOG.
Farr Telephone and Construction Supply Co.,
DEPAT. C. Manufacturers of Telephones, Switch Boards and Telephone Supplies
118-120 W. Jackson Boulevard, Chicago
Key and Sounder No. 8.
No 50
No 14

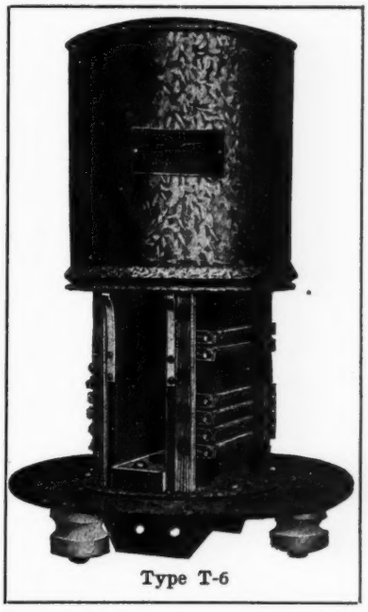
Please tell the Advertiser you saw his Announcement in TELEPHONY.

Cook's Pole Cable Terminals and Junction Boxes



Type S W Front View

FOR
MULTIPLE
TAP
CABLE
DISTRIBUTION



Type T-6

Cook's Terminals furnish the most approved forms of protection, and the best and simplest means of cable distribution. Cook's Junction Boxes are the best for cable splicing. They can be used in conjunction with the terminals or alone. At points where you desire to dead-end your cable, use Cook's Junction Box. You can add a cable terminal later if you wish. Cook's Terminal for multiple tap cable distribution combines terminal and distributing ring. Protectors can be installed one pair at a time and increased as desired.

SELF SOLDERING NOZZLES

Are Furnished With Both Terminals and Boxes Write for Plan for Your Cable Lay-Out

Frank B. Cook.

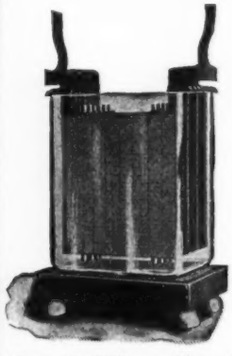
242 WEST LAKE STREET CHICAGO, ILLINOIS

Telephone and Telegraph Wire

High grade, extra double galvanized, tough, pliable, and always uniform. Guaranteed standard, to withstand every test, and to be the equal of any telephone or telegraph wire on the market. Our wire has been tested at the leading institutions of Technology with best results. We give you positive assurance that our wire is all we claim for it. Handled by leading jobbers or can be purchased direct.

Indiana Steel and Wire Co., Muncie, Indiana

PIONEER INDEPENDENT MANUFACTURERS



RELIABLE
For
Central
Energy
Telephone
Systems

Branch Offices: New York, Chicago

"Unit

Ask for Bulletin on "A MODERN TELEPHONE EXCHANGE"

National Battery Company.

ELECTRIC STORAGE BATTERIES
BUFFALO, N. Y.

Accumulator"

General Electric Company

Edison Telephone Lamps

Thorough uniformity of all lamps, insuring certainty of contacts and no misfits.

Cut shows regular 24-volt tipped lamp, base 54G. 885

Edison Decorative & Miniature Lamp Department

HARRISON, - - NEW JERSEY

FOR TELEPHONES

Fire Alarm System, District Messenger Call Boxes, Watchman's Outfit, go to the

VIADUCT MFG. CO., BALTIMORE, MARYLAND

Our POCKET TELEPHONE is a Great Success

Our FARMERS' SPECIAL TELEPHONE Best Made

WE FURNISH A GUARANTEED NONBREAKABLE Receiver

SEND FOR CATALOG AND PRICES

Please tell the Advertiser you saw his Announcement in TELEPHONY.

NORTH
ANNOUNCEMENT
Owing to the great growth of our business in the Central West and the increasing demand from our customers for a nearby base of supply, we have opened a warehouse and salesrooms at
KANSAS CITY, MO., 317-319 SOUTH WEST BOULEVARD
Our Standard Instruments will be shipped from our factory in car load lots. We will carry a full line of our equipment, and will be in position to fill orders much more quickly than if shipped from Cleveland direct.
We will also carry a complete stock of construction material and tools.
Our Kansas City branch will be open for business on and after May 12th.
You are cordially invited to call and inspect our apparatus.
THE NORTH ELECTRIC COMPANY
KANSAS CITY
CLEVELAND
DALLAS
THE
NORTH ELECTRIC CO.
CLEVELAND, OHIO

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Construction Material

OF ALL KINDS

Double Galvanized Iron Wire

W. P. Iron Wire Insulators

Cross Arms and Braces

Pins

You are in the market for some of the above.

Why not get our prices?

We can save you money — a quotation will prove this.

Now $9\frac{1}{2}$ Cents Each

Now $9\frac{1}{2}$ Cents Each

Barrel lots f. o. b. Chicago or New York

Price Reduced Quality Unchanged

Interior Wire Brackets

Anchor and Guy Rods

Tools

Buying this class of material for our two immense wholesale and retail houses enables us to make you very attractive prices.

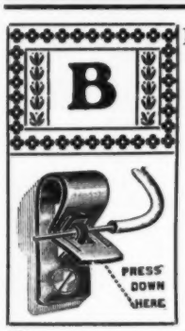
Prompt shipments from stock.

Manhattan Electrical Supply Co.

188 Fifth Avenue

NEW YORK CHICAGO JERSEY CITY

Off with the Old and On with the New



BECAUSE you have always used the old style screw binding post, is no argument against the new style FAHNESTOCK SPRING BINDING POST. This is a device which is as superior to the regular screw type as a Waltham watch is to an hour glass. It eliminates all troubles due to loose or faulty contacts and is in a great measure the most important terminal improvement ever made.

¶Simply press down on the spring ear and insert the wire in the eye, then let go, and the wire is making a better, surer contact than can be secured by any other means. It can't cut, because the design of the holding surfaces and the tension of the spring is just right. It can't work loose, because the clip holds it almost immovable, and it cannot corrode, because it is open to air circulation except at the point of contact. Wires cutting, working loose, and becoming corroded have always been a large source of trouble and expense. Why tolerate these troubles when the Fahnestock Post eliminates them? When so ordered, all batteries will be equipped with them FREE OF COST. If you like, we'll send you a sample to show you how it is done.

Fahnestock Electric Co.

129 PATCHEN AVENUE BROOKLYN, N. Y.

You Lose Subscribers

because of the little things in the business. There is little difference between one man and another, but that little counts for a great deal. It is the little things that count.

We have been making dry batteries for eighteen years and every year we have tried to make them a little bit better than the year before. In doing so we think we have helped to lessen telephone troubles, and helped the telephone business.

The "1900" dry battery is one of the little things that make for perfection.

TRY IT.

The Nungesser Electric Battery Co.

27 King Street, Cleveland, Ohio.

General Sales Offices: 128 W. JACKSON BLVD., CHICAGO, ILL.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Swisher Marline Cable Hanger.

(PATENT APPLIED FOR)

In the illustration we show in figure No. 1 the Swisher Marline Hanger in figure No. 2 the old style now in common use. The advantages we claim for the Swisher Hanger are:

First, easy to install.

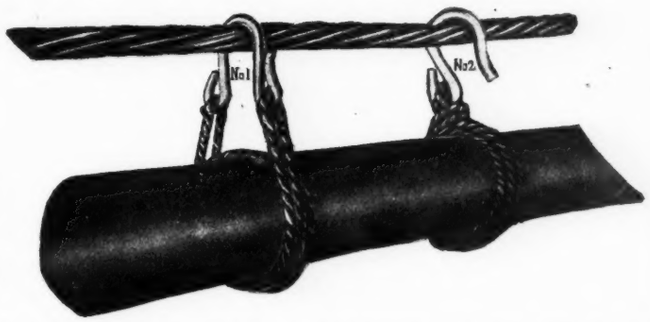
Second, greater strength.

Third, hook cannot become detached from strand.

Fourth, hook cannot straighten under strain and let cable down.

Fifth, in stringing of wires over cable, wires sagging will not catch under hook as in old style.

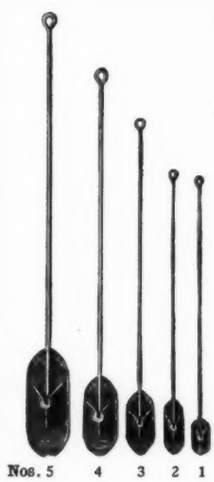
Sixth, after cable has been installed, same can be pulled without opening the hooks.



We use only the best grades of marline and No. 9 hooks galvanized after forming. Our No. 9 hook on account of its construction will stand a greater strain than a No. 6 hook of old style. WRITE FOR PRICES.

"Hercules" Anchors

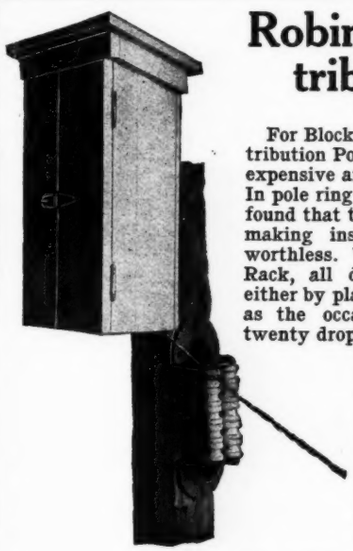
THE IRON DEAD MAN



Made of Malleable Iron in Five Sizes.

No. 1—Rod	½"x6'	Plate	5"x10"
No. 2— "	⅝"x6'	"	6"x15"
No. 3— "	¾"x7'	"	8"x18"
No. 4— "	1 "x8'	"	10"x22"
No. 5— "	1¼"x9'	"	12"x30"

We will ship and prepay freight on first order of twelve anchors. If not satisfactory, return at our expense.



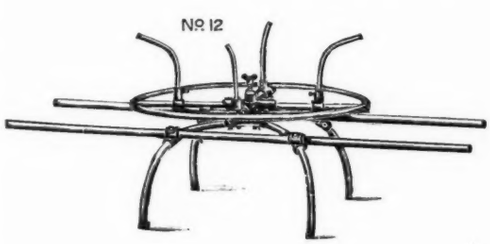
Robinson Pole Distribution Rack

(PATENT PENDING)

For Block distribution the Robinson Distribution Pole Rack is the most simple, inexpensive and practical device of its kind. In pole ring distribution it has often been found that the leads are all in one direction making insulators on one side of ring worthless. With the Robinson Distribution Rack, all drops can be easily handled, either by placing Rack on one or both sides as the occasion demands, for example, twenty drops equally divided, one ten pair rack would be placed on each side of pole. In case the twenty drops were all on one side, a twenty pair rack would be placed on that side of pole. The top and lower pieces are heavy well braced castings of great strength. It is not necessary to gain pole as racks have convexed surface.

WRITE FOR PRICES.

READY PAY OUT REELS



We Illustrate Our No. 12 **"READY" REEL**

WITH BARROW AND TENSION.

These Reels are Made in Ten Styles.

Send for Catalogue No. 3 of **NAGLE'S SPECIALTIES**

The W. G. Nagel Electric Co.

27-31 St. Clair Street :: :: :: TOLEDO, OHIO

A NEW TRANSMITTER

WHICH TALKS OVER THE LONGEST DISTANCES

With a tone and articulation as natural as the voice itself.

It is also unlike any other transmitter in design and construction.

Our Booklet No. 91-C describes it fully. Write for a copy to-day.

STROMBERG-CARLSON TELEPHONE MFG. COMPANY

ROCHESTER, N. Y. CHICAGO, ILL.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

"How Much Cable Shall We Be Able to Add this Year?"

That's really the cable question to-day. It's not shall we use cable, but how rapidly can we install it?

Just think, if you can, of one argument against cable. There are plenty for it, of course. But in all seriousness, do you know one good reason why your wire trouble should not be reduced to the minimum, or why your repairing expense should not be brought to the lowest possible figure?

On the other hand, isn't it true that the initial saving of open wires over cable is liable to be wiped out completely within a very short space of time?

Open wires have hosts of enemies, you know, beside storm and fire. Cable has almost none.

You'll have to look these facts in the face sooner or later. Better begin to-day by writing for our Booklet No. 79-C on Cable—The Making of It. It's yours for the asking.

STROMBERG-CARLSON TELEPHONE MFG. CO.
ROCHESTER, N.Y. CHICAGO, ILL.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Telephones for the Deaf

Every telephone manager interested in the success of his service and the satisfaction of his subscribers and their friends, owes it to himself to investigate the AUROPHONE, manufactured and offered for sale by THE MEARS EAR PHONE CO., Suite 720, Stewart Building, Chicago, (opposite Marshall Field's on State St).

If you attend the National Telephone Convention in Chicago, June 26-28, do not fail to drop in and see this wonderful device. If you cannot come, send for our descriptive matter and price list.

THE AUROPHONE is made in two forms—

1—The Portable, for individual use, which may be carried in the pocket or concealed in the waist.

2—The Stationary which is extensively employed in many of the leading halls, churches, theaters, etc.

We have just completed installation of stationary AUROPHONES in the great Hippodrome in New York City. The Rev. Dr. William Thomas Beale, pastor of the Harvard Congregational Church, Boston, Mass., in writing about the AUROPHONES which he had installed in his church recently says: "It has been my pleasure to see the eyes of the deaf fill with grateful tears as they told the joy of hearing the entire service for the first time in years. 'Without it, I could hear nothing; with it, I could hear everything, is a sample of the expressions deaf persons have made at the close of the service."

W. J. Shedd, president of the Knickerbocker Ice Co., Chicago, writes as follows regarding the portable AUROPHONE: "I am much pleased with your Aurophone. I have tried every device that came to my knowledge for twenty years, and yours is the only one that I consider of any value."

The AUROPHONE not only enables one to hear perfectly, but it has the effect of exercising the ear, and in time improves the hearing so that one no longer needs a device of any kind.

There can be no deception about an instrument like the AUROPHONE—it either does or does not enable you to hear, and since you try it on yourself you take no one's word but your own.

We would prefer to have people interested in the AUROPHONE call in person, but if that is inconvenient be sure to write for illustrated booklet, History Blank, etc., which are gladly sent anywhere without charge. By a plan that has proved successful we are enabled to grade the AUROPHONE to meet the requirements of persons at a distance, whom we do not see. Be sure to write us about this.

Address all correspondence to

THE MEARS EAR PHONE COMPANY, Suite 720 Stewart Building
98 STATE STREET : : CHICAGO

Batteries

and all other
Telephone Supplies
of the best make

We ship promptly and our prices are right

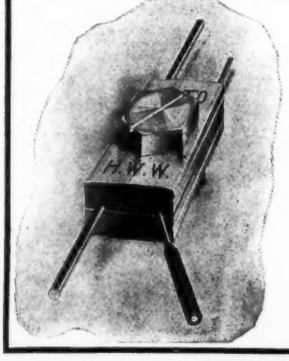
NEBRASKA ELECTRIC COMPANY

13th and Harney Streets
Telephone Douglas 1408

OMAHA

Use **Steel Insulator Pins**
WESTERN UNION STANDARD
Button Head Pole Steps
WITH TWIST THREAD TO DRIVE
Steel Cross Arm Braces
Rolled Steel Guy Clamps
MANUFACTURED BY
OLIVER IRON & STEEL CO.
PITTSBURGH, PA.

The "H.W.W." Wire-Connector



Improved Type

The Standard Telephone Test Connector for Similar or Dissimilar Wires .040" to .104" Diameters

Chicago Brass Co.
166 Lake Street Chicago

Please tell the Advertiser you saw his Announcement in TELEPHONY.

The Lundquist Automatic System

will be exhibited during the

National Telephone Convention

At the Auditorium Hotel,
Chicago, Ill.

June 26 to 28, 1906

The Lundquist System is the only automatic trunking and grouping system in existence. Thoroughly protected by patents No. 747,197 and No. 776,524 and by numerous other patents and pending applications. The public is warned against purchasing exchanges which infringe these patents.

The Globe Automatic Telephone Co.

Chicago, Ill.

Western Union Steel Cross Arm Pin

Especially interesting to CONSTRUCTION MEN, owing to the advanced prices and scarcity of locust pins.

It has been adopted as the standard by the Western Union and Postal Telegraph Companies, and is made according to their specifications.

Highly carbonized steel is used, giving it great strength and stiffness.

The steel pin requires a hole with only a ½-inch diameter, as against a 1½ inch hole required by the wooden pin. This strengthens instead of weakening the cross arm.

WRITE FOR PRICES

Do not forget the National Telephone Convention to be held in Chicago, June 26, 27, 28. Delegates and visitors are cordially invited to make our office their headquarters and we will be pleased to show you the best equipped supply house in America.

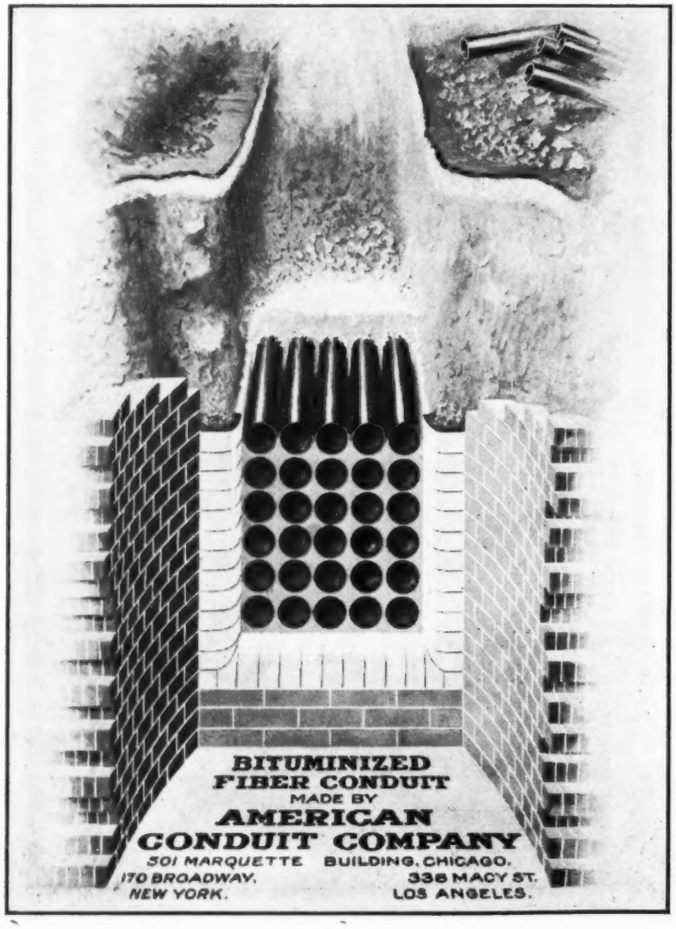
OKONITE IT NEVER DISAPPOINTS

Central Electric Company,

ELECTRICAL SUPPLIES

264-266-268-270 FIFTH AVENUE, CHICAGO

OKONITE IT NEVER DISAPPOINTS



WE ARE POSITIVE THAT

MORGAN & WRIGHT TAPE IS GOOD TAPE

because the biggest tape users will use no other. Think you they would do that without reason? They don't. Here are the reasons: Exceptional adhesive qualities, no rapid drying out, smoothness in unrolling, uniform insulation and high insulation resistance, ability to withstand extreme heat much longer than the severest tests demand, uncommonly high percentage of insulation composition. : : : :

TO CONVINCE OU, WE'LL SEND YOU SAMPLES FREE IF YOU ASK FOR THEM

Morgan & Wright
Chicago

CADIZ TELEPHONES

THE MOGULPHONE
BEST MADE

THE CRESCENTPHONE
THE CHEAPEST THAT'S GOOD

GOOD NEWS FOR OUR PATRONS

We have added a Pin and Bracket Department along with other extensive additions recently made to our plant and will hereafter manufacture and sell direct to the consumer, Locust and Oak Pins and Oak Brackets. We can make attractive propositions on contracts for the year's supply of TELEPHONE EQUIPMENT and LINE MATERIAL.

REMEMBER

Cadiz Telephones are not the Average Kind.
They Are Uncommonly Good.
Samples Sent on Approval to Responsible Parties.

THE CADIZ ELECTRIC CO.

3 C. C. C. BLDG., CADIZ, OHIO

Please tell the Advertiser you saw his Announcement in TELEPHONY.

DON'T TRY

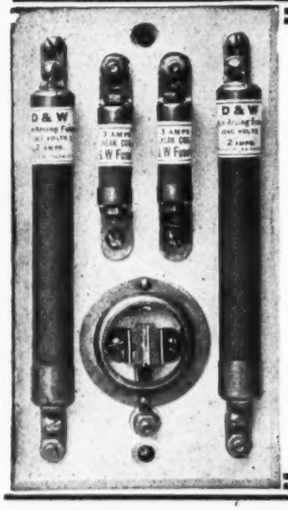
to save money by using thinly galvanized wire, made from common grades of steel, for Telephone Wire. *It pays to use the best.* ROEBLING DOUBLE GALVANIZED Telephone Wire is made from carefully selected materials and galvanized by methods which are the best results of an experience of more than 50 years. It is the cheapest wire on the market, not because it is the lowest in price, but because it gives good service years after inferior grades have been discarded. -:- -:-

John A. Roebling's Sons Company

MAIN OFFICE AND WORKS: TRENTON, N. J.

AGENCIES AND BRANCHES:

NEW YORK CHICAGO CLEVELAND ATLANTA
OAKLAND, CAL. LOS ANGELES PORTLAND, ORE. SEATTLE



Prepare for Electrical Disturbances by PROTECTING your TELEPHONE with

"D & W" COMBINATION CUT-OUT

ARRESTER ENCLOSED IN METAL CASE

Fuse, Sneak Coil and Arrester Mounted on One Porcelain

WRITE FOR CIRCULAR No. 102

D & W FUSE COMPANY, - PROVIDENCE, R. I.

DIVIDENDS WILL INCREASE and troubles diminish IF YOU SPECIFY

SUPERIOR BRAND

By this name you will know our make of INSULATED IRON LINE WIRE (or Tree Wire) and Galvanized Strand. Wise telephone people use our brand, and that's a pointer for you to write for prices and

DO IT NOW.

WEATHER-PROOF WIRE SUPERIOR BRAND STANDARD WEIGHT

Western Insulated Wire Company

MANUFACTURERS

170-174 South Clinton St., CHICAGO, ILL.

EDWARD E. CLEMENT

ELECTRICAL ENGINEER, PATENT ATTORNEY.

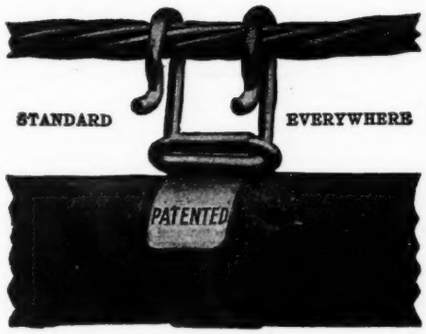
Investigation and Development of Inventions, Consultations, Reports, Patents and Patent Causes.

OFFICE:

McGILL BUILDING, WASHINGTON, D. C.

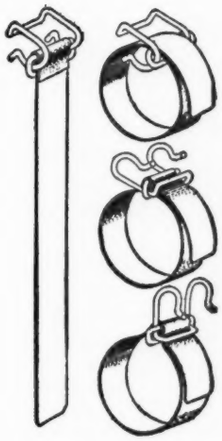
LEADERS
IN CABLE SUPPORTS

"Boston" Cable Clips



BEST
SIMPLEST
STRONGEST

DOUBLE
SUPPORT



"SHAWMUT" MARLIN CABLE HANGERS

BEST
Galvanizing
Marlin

PRICE and
QUALITY speak
for themselves

DO THESE INTEREST YOU?

SEE BULLETIN 30

Chase-Shawmut Company
NEWBURYPORT, MASS.

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Weston Electrical Instrument Company

Main Office and Works, Waverly Park, NEWARK, N. J.

New York Office, 74 Cortlandt Street

LONDON BRANCH—Audrey House, Ely Place, Holborn. PARIS, FRANCE—E. H. Cadiot, 12 Rue St., George.

BERLIN—European Weston Electrical Instrument Co., Ritterstrasse, No. 88.

WESTON Standard Portable Direct Reading

Voltmeters, Millivoltmeters, Voltammeters, Ammeters, Milammeters, Ground Detectors and Circuit Testers, Ohmmeters, Portable Galvanometers.

Write us regarding special voltmeters with very high resistance, particularly adapted for cable testing.

Weston Standard Portable Voltmeter

Weston Round Pattern, Model F, Station Ammeter.

PORTABLE DIRECT READING WATTMETERS

For Alternating and Direct Current Circuits.

The only standard portable instrument which deserves this name Absolutely permanent if not abused.

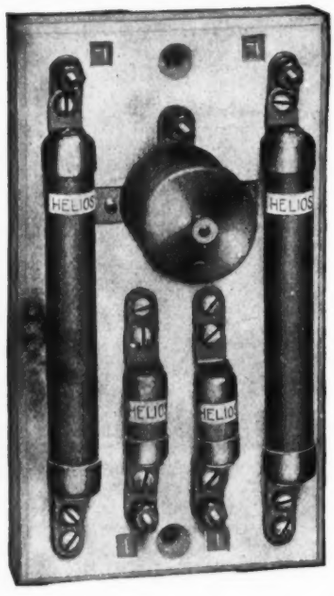
A New Catalogue on Voltmeters, Potential Indicators Ammeters for Central Stations and Isolated Plants

Highest Accuracy Least Consumption of Energy.

Semi-Portable Laboratory Standard Voltmeters and Ammeters

The most accurate and most convenient absolute standard ever offered.

Portable Direct Reading Wattmeter for Alternating and Direct Currents.



HELIOS Telephone Protectors

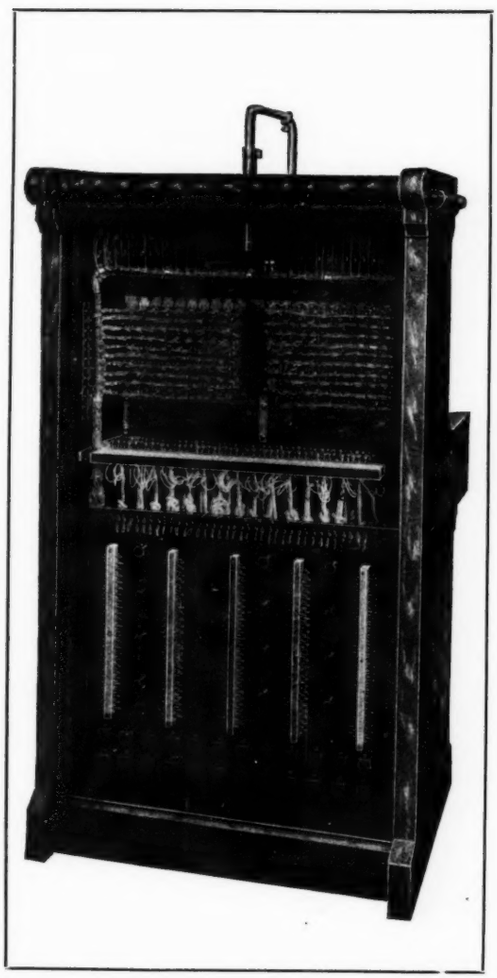
Listed and approved by the National Board of Fire Underwriters. Positively protects your telephones against Lightning. Made with or without Sneak Coils.

WRITE FOR PRICES.

HELIOS MANUFACTURING COMPANY

Bridesburg, Philadelphia, Pa.

CENTURY
100% GOOD



DO YOU KNOW that we have been manufacturing a common battery equipment for over six years?

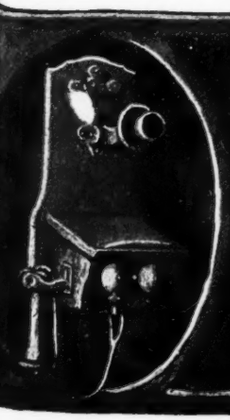
If you are in the market for common battery switchboards or telephones, it would be advisable to make an inspection of and test our apparatus.

You will find it superior in many ways.

We can refer you to Exchanges who have used our common battery apparatus with entire success for a number of years.

Let us make you prices on your requirements in these lines.

Samples will be shipped—charges prepaid.



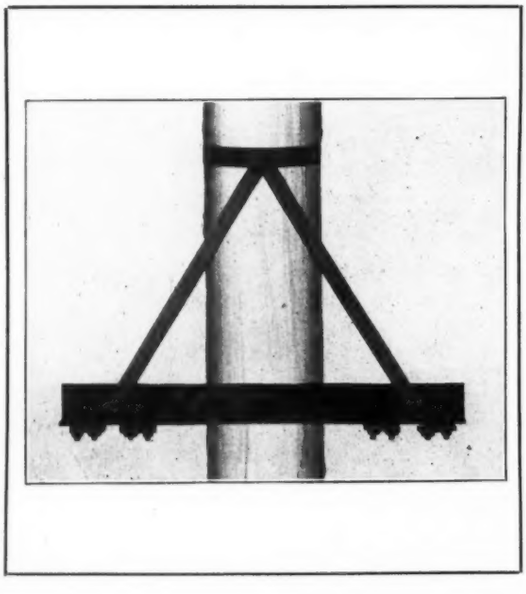
CENTURY TELEPHONE CONSTRUCTION CO.
332 ELLICOTT STREET
BUFFALO, N.Y.

Delegates and Visitors to the National Interstate Convention:
You are cordially invited to visit the
factory and exhibit of
International "Growing Exchange" Apparatus
and make our display room your headquarters.
Room 102, (Parlor Floor), Auditorium,
June 26, 27 and 28, 1906.

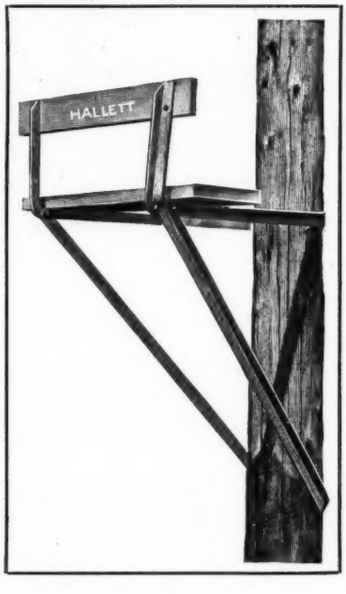
P.S.—Don't fail to see the International Transmitter

International Tel. Mfg. Co.
Harrison and Clinton Streets
Chicago

Experiments vs. Experience



Hallett goods are up-to-date, but not beyond. Would you feel better if you knew your orders were in the hands of practical men—at telephony as well as manufacture? Then call for Hallett's. We make pole seats—all kinds; messenger supports, cable arms, anchor rods, ground rods, capstans, jacks, cable reel wheels, and everything else you need out of doors.



HALLET IRON WORKS

96 WEST POLK STREET :: :: :: :: :: CHICAGO

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The Parts

That Made the Acme Famous

The **Blue Book** of **Telephone Information,** just out of press, tells many interesting things about Acme Telephones, made famous by their perfect parts. We'll send it postpaid promptly on request. Secure a copy. Be progressive, and strictly up to date. Write us to-day.

Acme Electric & Telephone Co.

MANUFACTURERS

CHICAGO, ILLINOIS

The Bull Dog Steel Gain

A steel cross arm support costing but very little more than the cost of cutting a gain.

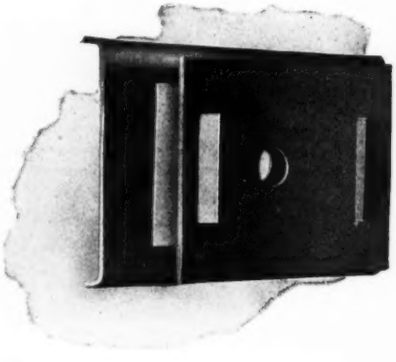
It consists of two steel plates, one engaging the pole and the other, the arm.

It makes it unnecessary to cut a gain in a pole and provides a most rigid support for an arm.

It eliminates the necessity of using braces on four and six pin arms.

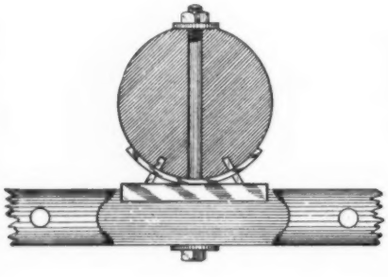
It fits any pole.

It can be placed on a standing pole easily and quickly.



It saves the great expense of cutting gains that are never used.

It provides a means of mounting new cross arms on old poles having rotted gains.



A through bolt and two large square washers are used for mounting.

Made for 3¾ inch and 4¼ inch arms in plain or galvanized.

Write for further description and prices.

Steel Gain Manufacturing Company
16 S. CLINTON STREET
CHICAGO, ILL.

CORRECT METHODS require that interior telephone wires be concealed.

We manufacture all sizes and styles of wood moulding for use in telephone or electric wiring. "Telephone" or "cable" moulding kept constantly in stock in large quantities. Prompt attention given to orders or inquiries for special styles and sizes of moulding. Write us your requirements and secure our quotations. We have catered satisfactorily for years to many of the leading concerns in the country and believe that we also can please you.

THORNTON AND COMPANY
87-89 West 14th Place CHICAGO Tel. Canal 1477

W. J. BURNS

AGENT FOR FACTORIES, FOREIGN AND DOMESTIC THINGS ELECTRICAL

163 RANDOLPH STREET
CHICAGO, U. S. A.
Telephone Main 3667

Remy Imported Magnet Steel
Telephone Mouthpieces
Telephone Receiver Shells

Incandescent Lamps
Telephone and Switchboard Cords, Switchboard Wires and Cables

ALSO, OTHER ELECTRICAL SPECIALTIES AND RAW MATERIAL USED IN THE MANUFACTURE OF ELECTRICAL GOODS. CLOSEST QUOTATIONS. PROMPT ATTENTION GIVEN ALL INQUIRIES.

Send me a memorandum of your requirements and get my proposition.

FOR SALE

One car of 1½x9" Telegraph Pins (Oak) painted, sacked, and ready for shipment. For prices apply to J. B. Galloway, Clarendon, Ark.

ANNOUNCEMENT— I wish to let my friends and customers know that I will continue in business as heretofore as purchasing agent for Telephone Companies. Address all mail intended for me to

Frow, Conover (Omitting "& Co.")

Tel. Central 6835 803-135 Adams Street, CHICAGO
Distributing Agent. Equipoise Telephone Arms

NEW IDEAS!

Latest and Best in Linemen's Test Sets, and Intercommunicating Telephone Apparatus. We also install complete Private Exchanges and furnish Equipment of the Highest Merit. Various other types of High Grade Apparatus for Exchange Work, etc., manufactured. Watch for illustrations of our new line of Apparatus in next issue.

NATIONAL AMERICAN TELEPHONE CO.
L. D. Telo: Main 687 141 So. CLINTON ST., CHICAGO

TELEPHONE REPAIRING

Send us your worn, damaged or inefficient apparatus, whether magneto, central energy switchboards or telephones. We will guarantee to make them as good as new and at the lowest possible cost consistent with correct work.

AN EXPERT ENGINEER SUPERVISES ALL OUR WORK.

Suggestions and recommendations cheerfully furnished customers in need of our services. Prompt attention given to all correspondence.

EAGLE ELECTRIC COMPANY
Factory: 1052 Milwaukee Ave. General Offices: 18 E. Van Buren St., Chicago

Please tell the Advertiser you saw his Announcement in TELEPHONY.

For Sale OR Exchange

1,000 Each of These New High Grade Guaranteed TELEPHONES

Will take Greenbacks, Silver or Gold

Send in
Your
Application
AT ONCE

We Positively Insure Each and Every Instrument to be a High-Class, strictly Correct and Up-to-date piece of Apparatus, backed in every respect by our fullest guarantee.

FOR FURTHER PARTICULARS ADDRESS

The Williams-Abbott Electric Co.

CLEVELAND, OHIO

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Second Annual Electrical Show

COLISEUM, CHICAGO, JANUARY 14-26, 1907

THE MARKET PLACE FOR EVERYTHING ELECTRICAL

Many Telephone and Kindred Manufacturers have already contracted for space. The Exhibits in this line will be extensive and comprehensive. Apply for space now in order to secure best location.

ADDRESS

Electrical Trades Exposition Company

HOMER E. NIESZ, Managing Director

139 ADAMS STREET, CHICAGO, ILL.

Headquarters during National Interstate Telephone Convention June 26-28, 1906, at Auditorium Hotel, Room 615.

Disinterested Technical Advice

WE have perfected an organization of competent telephone switch board installers, inside wire men, expert repair men, cable and line men. The services of this organization are at the disposal of the small telephone exchanges and toll line companies in any part of the United States. Our specialty is the rebuilding of small exchanges, and furnishing them with the latest and most up-to-date installation for their particular needs. We supply any type of apparatus that is best adapted to the individual demands. For a nominal sum, we send our chief engineer, at your request, and he will draw up specifications for any work for which you may be in need and we will agree to take a contract for a certain specified sum. We will explain to you the relative merits of the magneto system, central energy system and automatic system; the relative advantages of multiple cable distribution, vs. the ordinary construction. All work is carried on under the supervision of a practical telephone engineer of fifteen years experience. Write us at once, detailing what your wants are in the line of improvements in your present telephone system. :: :: ::

Telephone Engineering Association, Wolff Building, Chicago, Illinois

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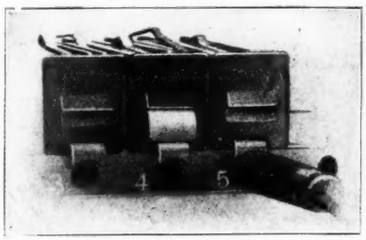
Unitype Switchboards

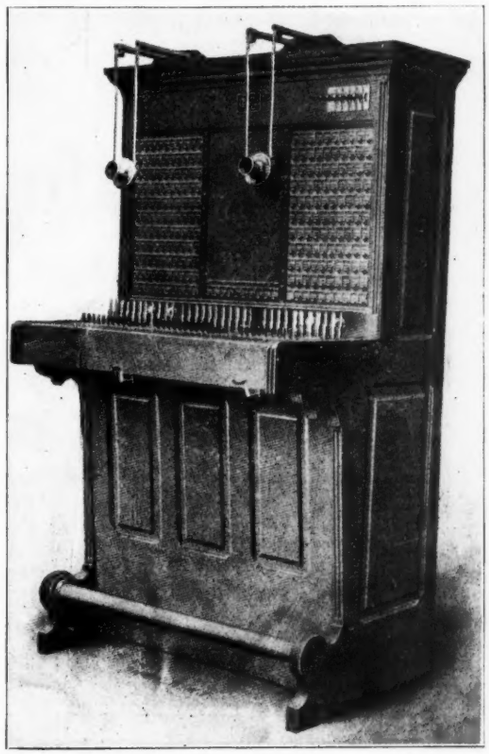


Front View, 3 Drops

Embody

DURABILITY
ACCESSIBILITY
SIMPLICITY

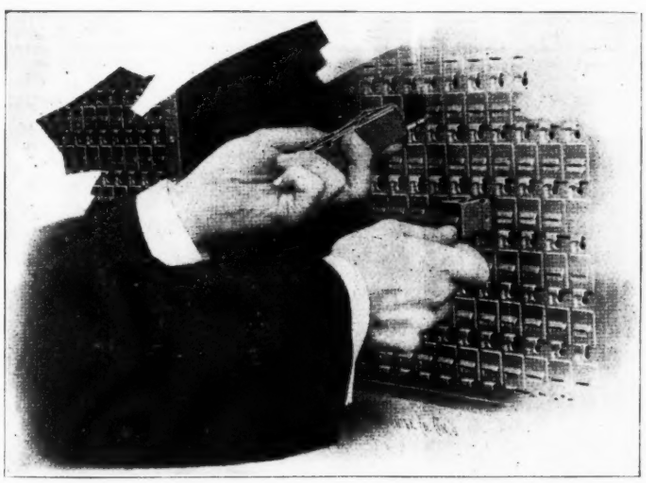
And Every Necessary Feature for Successful Operation



No. 53 Cabinet—200 or 300 Drops Capacity

When call is received, shutter falls through slot, when call is answered, shutter is automatically restored.

NO Springs
NO Double Windings
NO Extra Jack Contacts
NO Small Complicated Parts
NO Trouble



Removing a Unitype Drop. Just Pull Them Out

Transfer Capacity for 2500 lines; 30 cord circuits; 2 operators positions; pilot-lights connected to line and clear out drops.

Removing Coil From Drop—Just a Seconds Work

No screws to take out; no wires to unsolder. Remove as shown above. Just pull them out.

SEND FOR BULLETINS

THE SUMTER TEL. MFG. CO.

SUMTER, S. C., U. S. A.

THE WESCO SUPPLY CO.

Quality and Service

Are the Elements of first consideration in making WESCO Telephones. PRICE is considered afterward. The instrument itself must be *right* in every particular and detail before we place the approval and guarantee of our name and trade mark upon it; then it is sold at a price consistent with QUALITY. They are reliable goods at a reasonable price. They are *above* "suspicion."

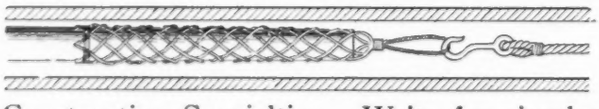
EVERYTHING ELECTRICAL

FT. WORTH, TEX. ST. LOUIS, MO.

We have made and sold the

GEM WIRE GRIP

for pulling in Telephone and Electric Light Cable for the past Three Years. By experience, we know how to make this device stand the severe strain of Cable Pulling. It is guaranteed superior to any other come along ever made. (All other types of this class are infringements,) and purchasers are warned. We make other Telephone Construction Specialties. Write for circulars and prices.



COLMAN J. MULLIN, 432 Kent Avenue, Brooklyn, N. Y.

High Grade Telephone Wood Work.

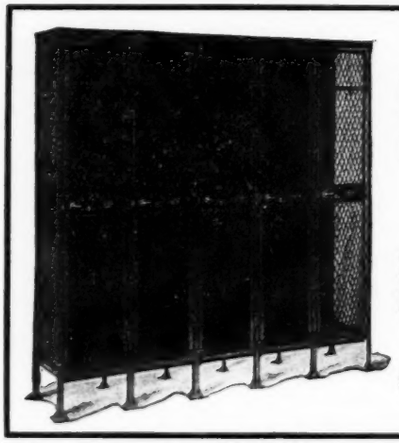
Dry Battery Cabinets, Switchboards, Central Energy Cabinets, Extension Bell Boxes, Etc.

Finish of Superior Quality

Plymouth Novelty Mfg. Co.

Correspondence Solicited

Plymouth, Indiana



There is only one

Pen-Dar Metal Locker

that is Germ Proof, Ventilated, All Steel and a Time Saver

WE MANUFACTURE IT.

Edward Darby & Sons Co.

Incorporated

225 Arch St., Philadelphia, Pa.

Estimates cheerfully given

Please tell the Advertiser you saw his Announcement in TELEPHONY.

WHAT'S WRONG

with that TELEPHONE INVESTMENT of yours?

Why doesn't it pay you as well as the best of your investments?

Is the reason bad management or bad equipment? More likely the latter.

Probably the company is trying to do a 20th Century business with 19th Century apparatus.

If that's the case, it is spending more and earning less than it might if it had our Automatic Telephone equipment.

This is the only really modern telephone system. It produces the ideal telephone service—quick, sure and secret—at half the operating expense of a manual equipment, and this service commands better rates.

It costs a fixed price per hundred lines to enlarge the automatic exchange, instead of an increased price per each hundred lines, as in the manual equipment.

The automatic exchange is never outgrown; it never has to be "scrapped" and replaced by a complete new one, as with the manual. You just add to it as you do to a sectional book-case.

All these points bear upon the stability and value of your telephone securities. They mean dividends to you.

Over ninety per cent of all the large orders placed during the past few years, either for new installations or replacements, have been for our automatic system, and all the companies adopting it have, from the increased earnings, been able to pay the interest on their bonds and a good dividend on their stock.

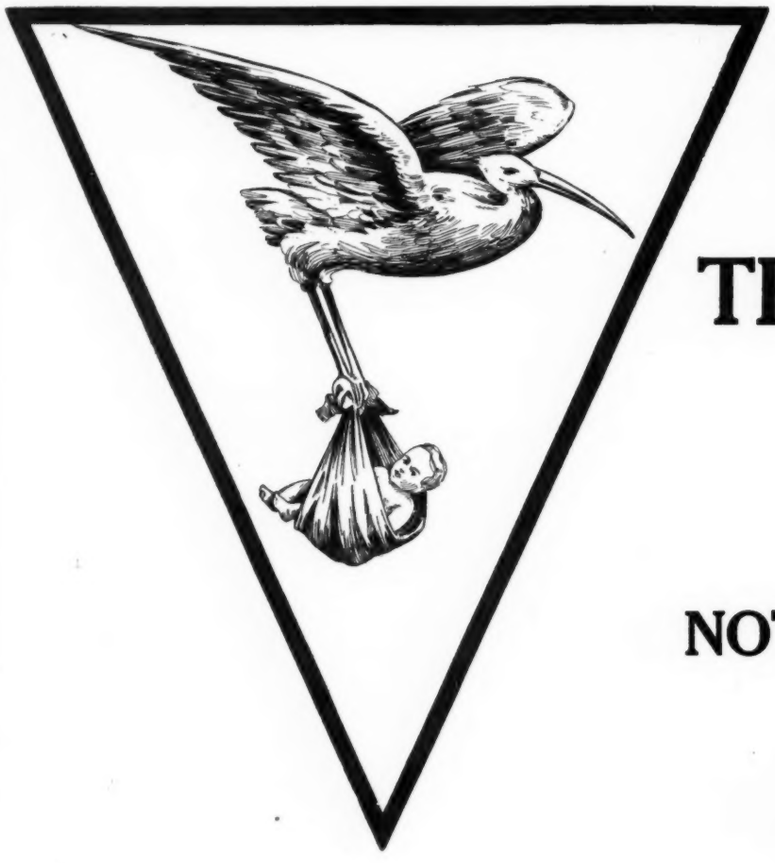
Our Automatic system has been adopted in the following cities:

Aberdeen, S. D.
Akron, Ohio.
Albuquerque, N. M.
Allentown, Pa.
Auburn, Me.
Auburn, N. Y.
Battle Creek, Mich.
Bellingham, Wash.
Berlin, Germany.
Buxton, Iowa.
Cadillac, Mich.
Chicago, Ill.
Clayton, Mo.
Cleburne, Texas.
Columbus, Ga.
Columbus, Ohio.
Dayton, Ohio.
El Paso, Texas.
Fall River, Mass.
Ferguson, Mo.
Florenceville, N. B., Can.
Grand Rapids, Mich.
Hastings, Neb.
Havana, Cuba.
Hazleton, Pa.
Hopkinsville, Ky.
Jonesboro, Ark.
Lake Benton, Minn.
Lewiston, Me.
Lincoln, Neb.
Los Angeles, Cal.
Manchester, Iowa.
Marianao, Cuba.
Marion, Ind.
Medford, Wis.
Miamisburg, Ohio.
Mount Olive, Ill.
New Bedford, Mass.
Oakland, Cal.
Ocean Park, Cal.
Pentwater, Mich.
Portland, Me.
Portland, Ore.
Princeton, N. J.
Riverside, Cal.
San Diego, Cal.
San Francisco, Calif.
Santa Monica, Cal.
Sawtelle, Cal.
Sioux City, Iowa.
South Bend, Ind.
St. Marys, Ohio.
Tacoma, Wash.
Toronto Jct., Can.
Traverse City, Mich.
Van Wert, Ohio.
Watch Hill, R. I.
Wausau, Wis.
Westerly, R. I.
Wilmington, Del.
Yuma, Arizona.

AUTOMATIC ELECTRIC COMPANY

Van Buren and Morgan Streets **CHICAGO, U. S. A.**

Please tell the Advertiser you saw his Announcement in TELEPHONY.

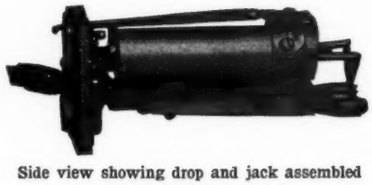


LATEST

THE ARMY DR

NEW

NOT SELF RESTORING



Side view showing drop and jack assembled mounted on section of strip

The drop and jack are very easily removed by unscrewing the jack face only

APPROVED BY ELECTRICAL

WILL NOT GET OUT OF ADJUST

STERLING ELECTRIC COMPANY

STERLING ELECTR

Please tell the Advertiser you saw his Announcement in TELEPHONY.

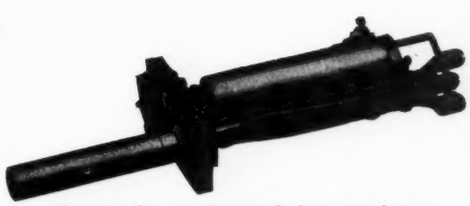
ARRIVAL ARMY DROP

OP IS BUILT ON LINES

BUT PLUG RESTORING

Front view showing location of shutter and jack face

THE GOVERNMENT ENGINEERS



View showing plug inserted in jack, also jack connections to drop

MENT. NO CHANCE FOR WEAR

IC CO., LAFAYETTE, INDIANA

STERLING ELECTRIC COMPANY

SWEDISH-AMERICAN TELEPHONE CO. CHICAGO

No. 99

No. 99

The merit and worthiness of

Telephone Apparatus

is best evidenced by what the users say.

Forest Green, Mo., May 2nd, 1906.

Swedish-American Telephone Co., Chicago, Ill.

Gentlemen:—Your man was here and installed our switch-board, and everything works to perfection, and all members are well pleased with everything. We feel that we have been well taken care of by your company and are very glad we gave you the order. Yours very truly,

FOREST GREEN CO-OPERATIVE TEL. CO.
Per Orville Pitney, Sec'y.

We have many letters of like nature. In fact we daily receive communications from our customers voicing their satisfaction and appreciation of apparatus we furnish them, will send you book containing 100 such letters, on request.

"ROOM 612"

Auditorium, is where we will be located during convention, we will as usual display a complete line of apparatus and demonstrate the superiority of our product, we will also exhibit some new and unique features of Telephony that will be worth your while to see and hear, we invite you to make your headquarters with us, you will be cordially welcomed and we will do all we can to make you have a good time.

SWEDISH-AMERICAN TELEPHONE CO.

CHICAGO

Branches: 615 Bee Bldg., OMAHA
115 West 6th Street
KANSAS CITY, MO.

No. 88

No. 88

OKONITE TRADE MARK REG. U.S. PAT. OFFICE.

THE STANDARD FOR RUBBER INSULATION

OKONITE TRADE MARK REG. U.S. PAT. OFFICE.

1889
Paris Exposition
Medal

OKONITE
TRADE MARK
REG. U. S. PAT. OFFICE.

1893
World's Fair
Medal

OKONITE WIRES
MANSON TAPE
OKONITE TAPE
CANDEE WEATHER-PROOF WIRES

WILLARD L. CANDEE, H. DURANT CHEEVER, } Managers

GEO. T. MANSON, General Superintendent
W. H. HODGINS, Secretary

SOLE MANUFACTURERS

253 BROADWAY **THE OKONITE CO., LTD.** NEW YORK CITY

Black Hawk Dry Batteries Are Best

Highest Voltage, Strongest Amperage, Greatest Recuperation, Longest Life.

A sum total in superiority exceeding any other battery in the market by from 60 to 80 per cent.

Four New Features which you cannot find in any other Dry Battery made to-day. Write and ask us about them and get our prices.

The Black Hawk Battery is devised by an expert, made by skilled workmen and marketed by straightforward business men.

You want it in your TELEPHONE WORK

Address

Central Electric Mfg. Co.
ROCK ISLAND, ILL.

G. Felsenthal & Co.

219 E. VAN BUREN ST.
CHICAGO

Manufacturers of

Specialties in Celluloid

For Telephone Companies

INSTRUCTION CARDS, NAME PLATES, ETC., FOR USE ON TRANSMITTERS OR COIN BOXES

Write for Samples

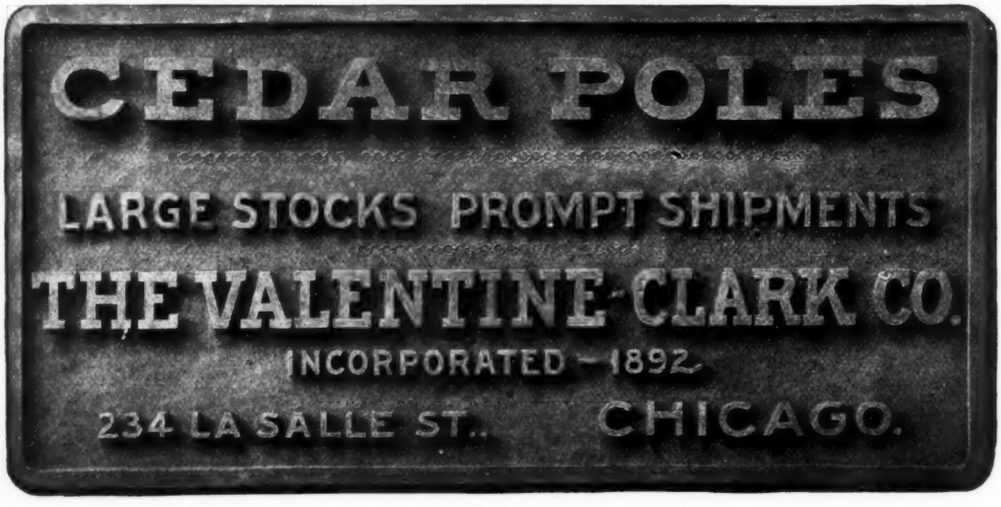
"GET THE BEST MADE"

RUBBER COVERED
Wires and Cables

We make all kinds of Wires for Electric Light and Power: wires for Telephone Service; wires for Large Stranded Feeders; wires for Car Cables; wires for All High-Class Conductors of Electricity. Correspondence solicited.

National India Rubber Co., Bristol, R. I.

Please tell the Advertiser you saw his Announcement in TELEPHONY.



POLES

30 Foot 40 Foot
35 " 45 "

We have Poles of the above lengths (also other lengths) for sale for prompt shipment

ALSO TIES

Naugle Pole & Tie Company

226 La Salle Street, Chicago

Please tell the Advertiser you saw his Announcement in TELEPHONY.

CEDAR POLES

LARGE BUTTS

We cut poles from lands owned by our Company in Northern Michigan on Lake Superior Shore, where the cedar is very **sound** and **stocky** with **heavy butts.**
All sizes in stock all the year round.

Write for a Copy of Our Telegraph Code for Cedar Products Giving Valuable Information About Poles.

C. H. WORCESTER CO.

Suite 1206, Tribune Building, Chicago, Ill., U. S. A.

"FROM FOREST TO CONSUMER."

CEDAR POLES

The Humbird Lumber Co., Ltd.

SAND POINT, IDAHO.

All Sizes Large Stock Low Prices
Prompt Shipments

LONG POLES A SPECIALTY.
WRITE FOR PRICES.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Pittsburg & Lake Superior Iron Co.,

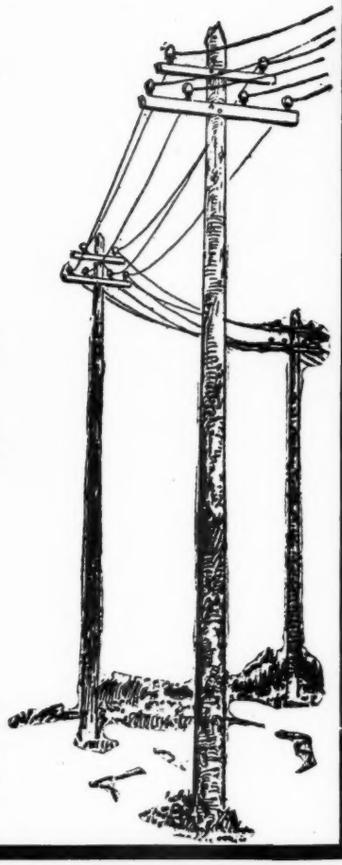
ESCANABA, MICHIGAN,

PRODUCERS AND WHOLESALERS

CEDAR POLES

FROM THE STUMP TO THE LINE.

WE ALWAYS CARRY A LARGE STOCK OF ALL SIZES OF WHITE CEDAR POLES, AND HAVING YARDS ON ALL PRINCIPAL RAILROADS IN NORTHERN MICHIGAN AND MINNESOTA, ARE IN POSITION TO MAKE IMMEDIATE SHIPMENT.



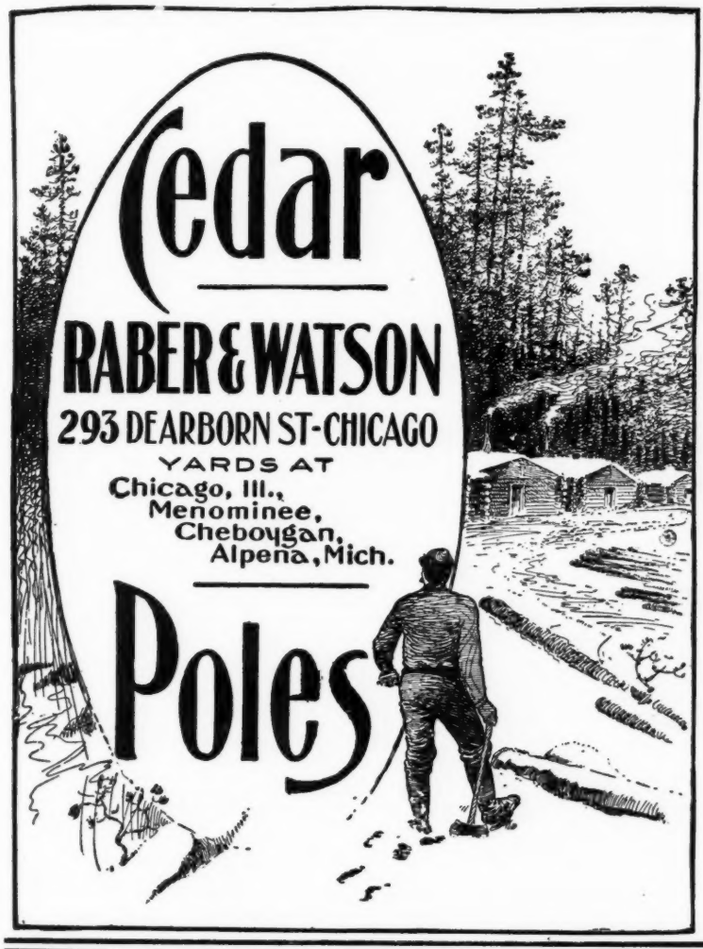
Principal Yards { MENOMINEE, MICH. PESHTIGO, WIS. CAVOUR, WIS.

CEDAR POLES

PRODUCERS AND WHOLESALERS of the class of POLES your construction demands. Prompt shipment absolutely guaranteed. Write US for Delivered Prices.

C. J. HUEBEL CO., Menominee, Mich.

Please tell the Advertiser you saw his Announcement in TELEPHONY.



HON. FREDERICK COOK, President EUGENE H. SATTERLEE, Vice.Pres
GEORGE E. FULLER, Sec. & Treas.

Rochester Telephone Company

OFFICES and EXCHANGE
59 Stone Street
ROCHESTER, N. Y.

Messrs. Raber & Watson,
Old Colony Building,
Chicago, Ill.

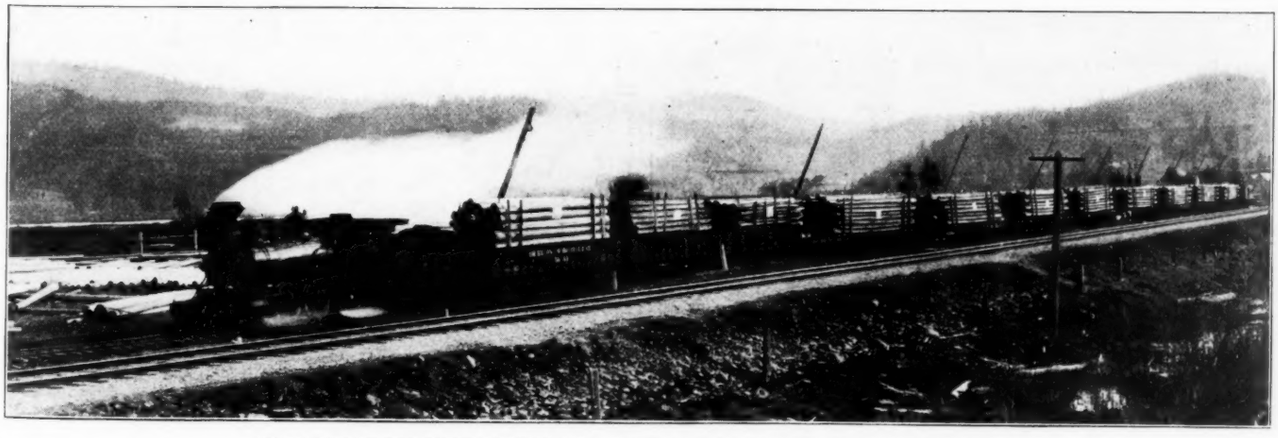
Gentlemen: I was in Chicago last week and intended seeing you, but was very busy while there, and did not get to your office, very much to my regret. Our Poles are arriving in sections, that is a car at a time, nearly all of them have been received. You certainly did yourself credit in the matter, as the unanimous opinion of everyone that have seen them is, that they are "the best lot of poles that ever came to Rochester."

Thanking you, I remain,
Yours truly,
C, O. HARRIS.

THE LINDSLEY BROTHERS COMPANY

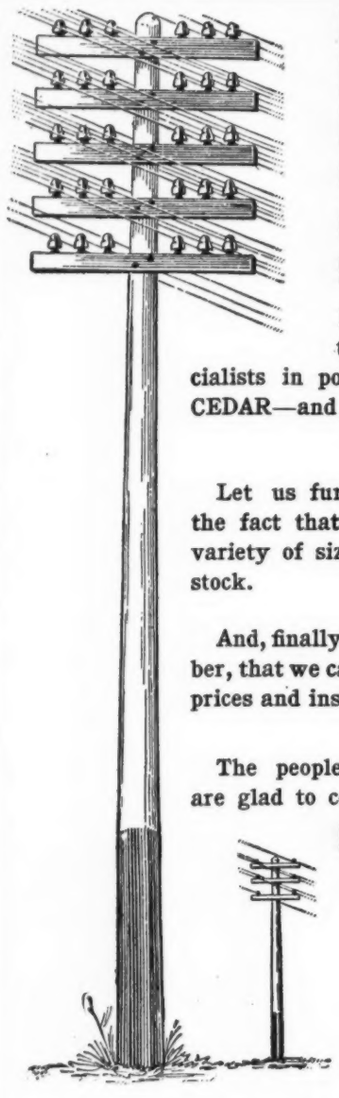
SPOKANE, - - - - WASHINGTON

Cedar Poles, Posts, Ties, Piling, Cross Arms.



ONE OF OUR ORDINARY TRAIN SHIPMENTS OF CEDAR POLES. THIS TRAIN HAS NINETEEN CARS

DELIVERED PRICES FURNISHED UPON REQUEST
WE CAN MAKE DELIVERY.



Big Poles and Little Poles But Every One of Them Good Poles

Let us impress upon you the fact that we are specialists in poles—the best IDAHO CEDAR—and nothing better grows.

Let us further impress upon you the fact that we have quantity and variety of sizes as well as quality of stock.

And, finally, let us ask you to remember, that we can quote you satisfactory prices and insure you prompt service.

The people who buy poles of us are glad to come again!

WHAT'S THAT A SIGN OF

?

SAND POINT CEDAR CO.
SAND POINT, IDAHO

PRODUCERS OF POLES THAT PLEASE

FILL OUT FOLLOWING BLANK AND MAIL TO US

SAND POINT CEDAR CO.
Sand Point, Idaho.

Gentlemen:

We will be in the market on.....

For.....Poles of following size:

.....

.....

.....

Name.....

P. O.....State.....

Cypress Telephone Poles

All Sizes Prompt Shipment

GOOD STOCK

All Poles Cut From Our Own Timber Lands

Save Middleman's Commission and Buy Direct from the Producer

Equal to Cedar But Cost Less

Try a Sample Car and Be Convinced

Write for Prices

Kennett Cypress Hardwood & Lumber Co.
KENNETT, MISSOURI

WHITE CEDAR POLES

POSTS and PILING

Mixed car lots a specialty

Write for delivered prices

HALL L. BROOKS CO.
HAYMAN BLOCK
TOMAHAWK, WISCONSIN

Chestnut Poles
Cedar Poles

Good Grades Prompt Shipments
Must Please

BUSINESS

Stocks Complete in
West Virginia
Kentucky
Idaho
and the
North

D. G. Groves & Co.,

Manhattan Building
CHICAGO

C. H. Dumert Lumber Co.

WHOLESALE LUMBER
WHITE CEDAR
POSTS & POLES
WHITE & RED
CEDAR SHINGLES

MINNEAPOLIS, MINN.

When you need TELEPHONE POLES please fill in the following blank and mail to us, and we will quote you our best delivered prices.

_____ 1906

C. H. Dumert Lumber Co.
Minneapolis, Minn.

Gentlemen:—We are in the market for the following strictly first class White Cedar Poles, for shipment to _____

____ Pieces ____ in. top ____ ft. long
____ Pieces ____ in. top ____ ft. long
____ Pieces ____ in. top ____ ff. long
____ Pieces ____ in. top ____ ft. long

Remarks: _____

An early quotation would greatly oblige. Yours truly,

Name _____

Address _____

T. M. PARTRIDGE LUMBER CO.

Producers and Merchants

White Cedar Poles

Large Stocks, Prompt Shipment, Full Assortment

Can furnish anything, but are long on following sizes:
4″ 16 ft. 4″ 20 ft. 5″ 25 ft.
5″ 30 ft. 6″ 30 ft.

Yards at

TENSTRIKE, MINN.
BLACKDUCK, MINN.
HOUPT, MINN.
NORTHOME, MINN.

Main Office, MINNEAPOLIS, MINN.

DULUTH LOG COMPANY, Duluth, Minn.

Please quote us prices on the following

White Cedar Poles

delivered F. O. B. cars:

4 in.	20 ft	pcs.	8 in.	30 ft	pcs.
5 "	20 "	"	6 "	35 "	"
6 "	20 "	"	7 "	35 "	"
4 "	25 "	"	8 "	35 "	"
5 "	25 "	"	7 "	40 "	"
6 "	25 "	"	8 "	40 "	"
7 "	25 "	"	7 "	45 "	"
5 "	30 "	"	8 "	45 "	"
6 "	30 "	"	7 "	50 "	"
7 "	30 "	"	7 "	55 "	"

Yours very truly,

.....

.....

Cut out the above and mail to us specifying your requirements and we will name you SPECIAL PRICES for prompt shipment on strictly No. 1 WHITE CEDAR POLES.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

White and Idado .... **Cedar Poles**

A new self-propelling steam loader switches cars and loads poles—and it is at your service whenever you want a rush shipment.

Just Installed at our Minnesota Transfer Yard

PAGE & HILL CO., Minneapolis, Minn

CEDAR POLE SPECIALISTS

Piling
Railroad Ties
Cedar Poles

WHOLESALE TIMBER
LUMBER, ETC.

EDW. Z. MASON
809 D. S. Morgan Building
BUFFALO, N. Y.

CEDAR POLES

Large Stock; Best Quality; Prices Right
Write us before purchasing elsewhere
WITTENBERG CEDAR CO.
WITTENBERG, - - WISCONSIN

MICHIGAN WHITE CEDAR
POLES
WILL OUTLAST ALL OTHER KIND

We can fill all size orders from our own stock.

100,000-150,000 AFTER APRIL 1
25 years have we been producers.

W. C. STERLING & SON CO.
Yards: Bay City, Omer, Boyne Falls
Principal Office: MONROE, MICH.

Idaho Cedar Poles

PACIFIC COAST POLE COMPANY
Spokane, Wash.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

PENDLETON & GILKEY
MINNEAPOLIS, MINN.
PRODUCERS OF EVERYTHING
IN CEDAR

CEDAR POLES

All Sizes Large Stock
Low Prices Prompt Shipments

YARDS:
MOUNTAIN, WIS. OCONTO, WIS.

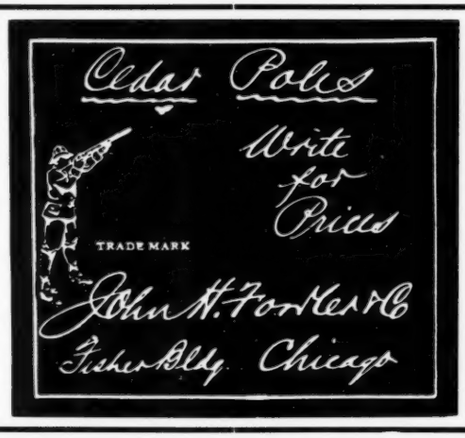
CYPRESS POLES

QUICK SHIPMENTS

ALL LENGTHS
COMPLETE STOCK
LOW PRICES

Write to-day for
DELIVERED PRICES

ABELES & TAUSSIG
ST. LOUIS, MO.



Chestnut Poles

J. I. M. WILSON CO.

Wholesale Producers

Bessemer Building - PITTSBURG, PA.

Idaho Cedar Poles

Large Stock. Best Quality. Prices Right. . . . . Write to us before purchasing elsewhere.

HERMAN VOGEL & CO.
CLARK FORK, IDAHO

Long Cedar Poles

We have the following dry poles we want to ship at once to make room for new stock:

10 Poles 8″ 40 ft. 95 Poles 8″ 45 ft.
78 Poles 9″ 40 ft. 58 Poles 9″ 45 ft.
8 Poles 9″ 50 ft.

These are located at our Cohasset, Minn., yard.
We have 40,000 poles banked on Mississippi river which will be in our yard by May 1st.
These run largely to 30 ft. and up.

J. W. MORRISON LUMBER CO.
918-919 Lumber Exchange MINNEAPOLIS, MINN.
YARDS: Deer River, Cohasset, Aitkin, Minn.

CEDAR POLES OF ALL LENGTHS AND SIZES
SPECIAL PRICES UPON APPLICATION
PROMPT SHIPMENT A SPECIALTY
A. E. WHITMORE, 230-31-32 Lumber Exchange, Minneapolis, Minn

Please tell the Advertiser you saw his Announcement in TELEPHONY.

CEDAR POLES

FRANCIS BEIDLER & COMPANY
CHICAGO, ILL.

POLE YARDS:
MENOMINEE, MICH.
ESCANABA, MICH.
SUPERIOR, WIS.
HERON, MONT.
CHICAGO, ILL.

CEDAR TELEPHONE POLES

Thoroughly seasoned. Immediate shipment. Any length or size. Seven distributing yards. Forty years' experience.

WM. MUELLER COMPANY, PRODUCERS OF WHITE CEDAR, SHINGLES, POSTS AND TIES.
Main Office, 1211-12-13 Marquette Bldg., Chicago.

We Are Producers and Wholesale Dealers in

WESTERN CEDAR POLES

NOTICE:

We own large tracts of Cedar Lands; have our own camps; manufacture our stock, and can furnish you poles 25 per cent cheaper than the scalper.

WRITE FOR DELIVERED PRICES

CHURCHILL CEDAR CO.
CABINET, IDAHO

FRANKEL'S ELECTRIC TESTING CLIP

Patented Nov. 15, 1904.

Get out of that rut of skinning the wires—IT'S EXPENSIVE. This device will save both valuable time and material—THAT'S PROFIT.

Sample Dozens.....$ 1.50 per doz.
Lots of 100..... 11.00 per 100.
Lots of 500..... 10.00 per 100.
Lots of 1000..... 9.00 per 100.

The teeth grip the wire or binding post. The pin pierces the insulation and makes a perfect test connection.

FROM YOUR SUPPLY HOUSE, OR
FRANKEL DISPLAY FIXTURE CO.
718 Broadway, New York

F. W. HANS, President. J. W. STEINMETZ, Secretary.

Hans Construction Co.
ELECTRICAL ENGINEERS

TELEPHONE LIGHTING POWER INSTALLATIONS
Cable Construction and Underground Conduit Construction a Specialty.
L. D. Telephone Main 4052. 88 and 90 La Salle Street CHICAGO, ILL.

Complete Telephone Exchanges Built and Material Furnished. Cable Construction and Underground Conduit Construction a Specialty.

The Butterfield Construction Co.
H. E. BUTTERFIELD, Pres.
TELEPHONE CONTRACTORS
Room 560, 113 Adams Street
Telephone Central 4585
Chicago, Illinois

Please tell the Advertiser you saw his Announcement in TELEPHONY.

THE WATCH AND THE TELEPHONE EXCHANGE

are very much alike in the respect that in order to obtain **good service each individual part** must be **GOOD. Good Batteries** are **JUST AS ESSENTIAL** to good service as good Switchboards, Telephones, etc.

COLUMBIA DRY CELLS

give **BETTER** and **LONGER** service than any other dry batteries we know of. Orders promptly filled. Special inducements on yearly contracts.

THE VOTE-BERGER COMPANY

MANUFACTURERS OF FIRST AWARD TELEPHONES AND SWITCHBOARDS

LA CROSSE, WIS., U. S. A.

No. 75 M—Only $4.00
Chief operator or toll board chair

There is Sound Sense in the use of NEVER BREAK

Andrews' Steel Rod Telephone Furniture

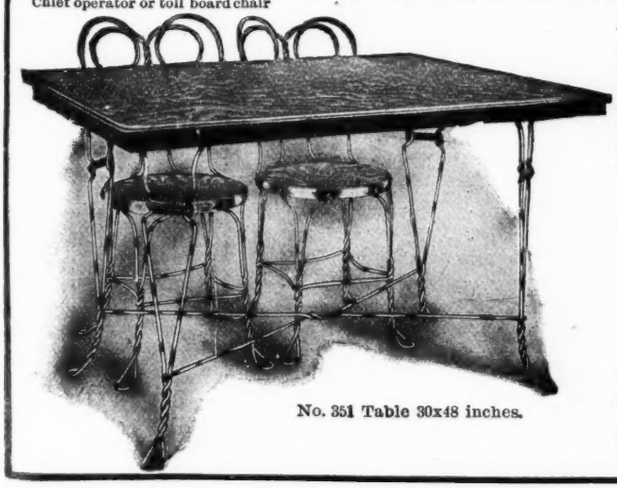
It is convenient—comfortable and lasts a lifetime—impossible to injure it or wear it out—the leading telephone exchanges throughout the country are rapidly adopting this style of furniture and wherever it has been given a trial it has met with unqualified approval.

Quality is the Best Policy

There is quality in ANDREWS' STEEL ROD FURNITURE

not to be found in the imitating kinds (for like all good things Andrews' Steel Rod Furniture is imitated). The metal part is handsomely and durably plated in Japanese Copper finish, the wood-work the best that experience and unequalled facilities can produce. This furniture appeals at sight to all practical telephone people.

No. 78 M—Operator's Chair



No. 351 Table 30x48 inches.

All Telephone Companies should adopt our Steel Furniture for exclusive use.

Send for Metal Furniture Catalog.

A. H. Andrews & Co.

174-176 Wabash Avenue :-: Chicago

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MANUFACTURERS OF

"Camp" Standard Vitrified Clay Conduits.

SALES OFFICES:

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OF all the good money savers introduced by us we consider the

SOLID FUSE

the best of them all. It is made of glass and copper burned into one piece. We are now prepared to meet all demands and orders will have prompt attention.

Made in 2 and 2½ inch lengths and from ⅛ to 2 ampere. Price $1.10 per hundred, lots of 500 or more $1.00 per hundred.

FISK-NEWHALL TEL. MFG. CO., 241-247 So. Jefferson Street
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Crawfordsville Wire and Nail Co.

MANUFACTURERS OF

"MONARCH" BRAND HIGH GRADE

Telephone and Telegraph

WIRE

E. B. B.-B. B.-STEEL
Single and Double Galvanized Signal Strand

OUR WIRE STANDS THE MOST EXACTING TESTS.
IF YOUR SUPPLY HOUSE CANNOT FURNISH IT, WRITE US. WE CAN.
PROMPT SHIPMENTS ALWAYS.

CRAWFORDSVILLE WIRE & NAIL CO.
CRAWFORDSVILLE, INDIANA, AND 1501 MONADNOCK BLDG., CHICAGO.

Telephony's Advertisers

¶ Which do you scan first—the reading or the advertising pages of your favorite magazines?

¶ Never in the history of the world was there a time when good advertising would so certainly succeed as now. It is an age of grand appreciation for intelligent publicity.

¶ Specifically speaking, we feel that this issue of TELEPHONY is eloquent evidence of judicious advertising. Our long list of patrons is a most gratifying tribute to TELEPHONY'S efficiency, as well as a striking commentary on the magnitude and prosperity of the telephone industry.

¶ With almost 200 different advertisers and every section of the United States represented—from ocean to ocean and from the Great Lakes to the Gulf—TELEPHONY shows this month the greatest volume of business it has enjoyed since the day it first appeared—five and one-half years ago.

¶ We are pardonably proud of this achievement, for there is nothing "mushroomy" nor temporary about the business which we carry. It is a good, healthy indication of the progress of the field and the prosperity it enjoys.

¶ TELEPHONY for June has surpassed all expectations. Let us ratify the good work by making our "National Convention Report Number" of July 1st even greater and more complete. This number will contain the first and best report of this important gathering. It will be an issue carefully read and generally preserved by subscribers everywhere.

¶ Advertising for the July number should be sent us as early in the month as possible.

Anchors, Guy.
Matthews & Bro., W. N., St. Louis, Mo.
Miller Anchor Co., Norwalk, O.
Nagel Electric Co., W. G., Toledo, O.
Wapak Hollow Ware Co., Wapakoneta, O.

Arms, Telephone Transmitter.
Baird Mfg. Co., Chicago, Ill.

Attorneys, Patent.
Belfield, A. Miller, Chicago, Ill.
Clement, E. E., Washington, D. C.

Aurophones.
Mears Ear Phone Co., Chicago, Ill.

Batteries, Primary.
Central Electric Mfg. Co., Rock Island, Ill.
French Battery Co., Chicago, Ill.
Independent Dry Battery Co., Chicago, Ill.
LaSalle Battery Co., Chicago, Ill.
Manhattan Electrical Supply Co., Chicago, Ill.
Monarch Elec. & Wire, Chicago, Ill.
National Carbon Co., Cleveland, O.
Nungesser Electric Battery Co., Cleveland, O.
Rock Island Battery Co., Cincinnati, O.

Batteries, Storage.
Gould Storage Battery Co., New York, N. Y.
National Battery Co., Buffalo, N. Y.

Boards, Power.
Dean Electric Co., Elyria, O.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.

Books, Telephone.
Telephone Printing Co., Defiance, O.
Telephony Publishing Co., Chicago.

Booths.
Fisher-Stevens, Charles City, Ia.

Brackets.
Central Tel. & Elec. Co., St. Louis, Mo.
Commercial Elec. Supply Co., St. Louis, Mo.
Illinois Electric Co., Chicago, Ill.
Peirce Specialty Co., Chicago, Ill.

Brass and Copper.
Plume & Atwood Mfg. Co., Chicago, Ill.
Scovill Mfg. Co., Chicago, Ill.

Cables.
American Electrical Works, Phillipsdale, R. I.
Commercial Elec. Sup. Co., St. Louis, Mo.
Electric Appliance Co., Chicago, Ill.
Indiana Rubber & Insulated Wire Co., Jonesboro, Ind.
New York Insulated Wire Co., New York, N. Y.
Okonite Company, New York, N. Y.
Standard Underground Cable Co., Pittsburg, Pa.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.

Cable Grips.
Mullin Co., Colman J., Brooklyn, N. Y.
Universal Cable Grip Co., Syracuse, N. Y.

Calculagraphs.
Calculagraph Co., New York, N. Y.

Call Registers.
Baird Mfg. Co., Chicago, Ill.

Clamps, Ground.
Blackburn, Geo., Cleveland, O.

Cleats, Fibre.
Blake Signal & Mfg. Co., Boston, Mass.
Yonkers Specialty Co., Yonkers, N. Y.

Climbers.
Blakeslee Forging Co., Plantsville, Conn.
Klein & Sons, Mathias, Chicago, Ill.

Clips, Cable.
Chase-Shawmut Co., Newburyport, Mass.

Coils, Induction.
American Electric Telephone Co., Chicago, Ill.
Central Tel. & Elec. Co., St. Louis, Mo.
Dean Electric Co., Elyria, O.

Conduit, Underground.
American Conduit Co., Chicago, Ill.
Camp Co., The H. B., New York, N. Y.
McRoy Clay Works, Brazil, Ind.

Connectors.
American Electric Fuse Co., Muskegon, Mich.
Chicago Brass Co., Chicago, Ill.
D. & W. Fuse Co., Providence, R. I.
Fahnestock Electric Co., Brooklyn, N. Y.
Yonkers Specialty Co., Yonkers, N. Y.

Contractors.
Crumb & Co., W. H., Chicago, Ill.
General Engineering Co., Chicago, Ill.
Hans Construction Co., Chicago, Ill.
Jones & Winter, Chicago, Ill.
Miller & McMeen, Chicago, Ill.
Telephone Engineering As'n, Chicago.

Condensers, Telephone.
Andrae & Sons Co. Julius, Milwaukee, Wis.
Dean Elec. Co., Elyria, O.
Electric Appliance Co., Chicago, Ill.
Williams-Abbott Electric Co., Cleveland, O.

Cords.
American Electrical Works, Phillipsdale, R. I.
Belden Mfg. Co., Chicago, Ill.
Burns, W. J., Chicago, Ill.
Premier Electric Co., Chicago, Ill.
Runzel-Lenz Elec. Mfg. Co., Chicago.

Counters.
Baird Mfg. Co., Chicago, Ill.
Veeder Mfg. Co., Hartford, Conn.

Cross Arms and Pins.
American Elec. Supply Co., Chicago.
Austin & Co., M. B., Chicago, Ill.
Central Electric Co., Chicago, Ill.
Central Tel. & Electric Co., St. Louis, Mo.
Commercial Elec. Supply Co., St. Louis, Mo.
Dearborn Electric Co., Chicago, Ill.
Doubleday-Hill Elec. Co., Pittsburg, Pa.
Electric Appliance Co., Chicago, Ill.
Ewing-Merkle Electric Co., St. Louis, Mo.
Farr Tel. & Con. Sup. Co., Chicago.

Galloway Co., J. B., Clarendon, Ark.
Illinois Electric Co., Chicago, Ill.
Maine Hub and Manufacturing Co., West Sebools, Maine.
Manhattan Electrical Supply Co., Chicago, Ill.
Nagel Electric Co., W. G., Toledo, O.
St. Paul Electric Co., St. Paul, Minn.

Drop Forgings.
Blakeslee Forging Co., Plantsville, Conn.

Engineers, Construction.
Baumfleck & Co., D., Chicago, Ill.
Butterfield Construction Co., Chicago.
Crumb & Co., W. H., Chicago, Ill.
General Engineering Co., Chicago, Ill.
Hans Construction Co., Chicago, Ill.
Jones & Winter, Chicago, Ill.
McMeen & Miller, Chicago, Ill.
Telephone Engineering As'n, Chicago.

Exposition, Electrical.
Electrical Trades Exposition Co., Chicago, Ill.

Extension Gongs.
Elec. Mfg. & Equip. Co., Atlanta, Ga.

Furniture, Steel.
Andrews Co., A. H., Chicago, Ill.

Galvanizers.
National Galvanizing Co., Chicago, Ill.

Gains, Steel.
Steel Gain Mfg. Co., Chicago, Ill.

Generators, Telephone.
American Electric Telephone Co., Chicago, Ill.
Chicago Telephone Supply Co., Elkhart, Ind.
Dean Electric Co., Elyria, O.
Eureka Electric Co., Genoa, Ill.
Fisk-Newhall Telo. Mfg. Co., Chicago.
Holtzer-Cabot Elec. Co., Chicago, Ill.
Monarch Telephone Mfg. Co., Chicago.
Stromberg-Carlson Tel. Mfg. Co., Chicago, Ill.
Vote-Berger Co., LaCrosse, Wis.
Williams-Abbott Electric Co., Cleveland, O.

Generator Winder.
Fisk-Newhall Telo. Mfg. Co., Chicago, Ill.

Generators, Ringing.
Current Elec. Co., Chicago, Ill.
Holtzer-Cabot Elec. Co., Chicago, Ill.
Roth Bros. & Co., Chicago, Ill.
Sandwich Pole Changer Co., Sandwich, Ill.
Viaduct Mfg. Co., Baltimore, Md.
Warner Electric Co., Muncie, Ind.

Guy Clamps.
Cook, F. B., Chicago, Ill.

Hangers, Cable.
American Electric Fuse Co., Muskegon, Mich.
Bissell Co., The F., Toledo, O.
Central Electric Co., Chicago, Ill.
Chase-Shawmut Co., Newburyport, Mass.
Cook, F. B., Chicago, Ill.
National Telo. Supply Co., Cleveland, O.
Standard Underground Cable Co., Pittsburg, Pa.

Hangers, Messenger.
Norton Tool Co., West Park, O.

Instruments, Measuring.
Leeds & Northrup Co., Philadelphia, Pa.
Weston Electrical Instrument Co., Newark, N. J.

Insulating Material.
Faultless Insulating Compound Co., Chicago, Ill.
New York Insulated Wire Co., New York, N. Y.
Runzel-Lenz Elec. Mfg. Co., Chicago.
Standard Underground Cable Co., Pittsburg, Pa.

Insulators, China and Porcelain.
American Electric Fuse Co., Muskegon, Mich.
Central Electric Co., Chicago, Ill.
Electric Appliance Co., Chicago, Ill.
Nagel Electric Co., W. G., Toledo, O.

Insulators, Glass.
Cutter, Scott C., Oswego, Ill.
Hemingray Glass Co., Covington, Ky.

Iron, Norway.
Blakeslee Forging Co., Plantsville, Conn.
Nash & Co., Geo., Chicago, Ill.
Stevens Co., Chas. G., Chicago, Ill.

Lightning Arresters.
Appleton Elec. Co., Chicago, Ill.

Lockers.
Darby, E. & Sons Co., Philadelphia, Pa.

Material, Construction.
Andrae & Sons Co., Julius, Milwaukee, Wis.
Austin & Co., M. B., Chicago, Ill.
Bissell Co., The F., Toledo, O.
Burns, W. J., Chicago, Ill.
Cadiz Electric Co., Cadiz, O.
Central Electric Co., Chicago, Ill.
Central Tel. & Elec. Co., St. Louis, Mo.
Chicago Telephone Supply Co., Elkhart, Ind.
Commercial Elec. Supply Co., St. Louis, Mo.
Cook, F. B., Chicago, Ill.
Dearborn Electric Co., Chicago, Ill.
Doubleday-Hill Elec. Co., Pittsburg, Pa.
Electric Appliance Co., Chicago, Ill.
Ewing-Merkle Electric Co., St. Louis, Mo.
Farr Tel. & Con. Supply Co., Chicago.
Fisk-Newhall Telo. Mfg. Co., Chicago.
Hallett Iron Works, Chicago, Ill.
Illinois Electric Co., Chicago, Ill.
Klein & Sons, Mathias, Chicago, Ill.
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Monarch Elec. & Wire, Chicago, Ill.
Mountain State Elec. Co., Wheeling, W. Va.
Nagel Electric Co., W. G., Toledo, O.
Nebraska Elec. Co., Omaha, Neb.
North Penn Iron Co., Philadelphia, Pa.
Norton Tool Co., West Park, O.
Oliver Iron & Steel Co., Pittsburg, Pa.
Peirce Specialty Co., Chicago, Ill.
St. Paul Electric Co., St. Paul, Minn.
Sterling Electric Co., Lafayette, Ind.
Sumter Tel. Mfg. Co., Sumter, S. C.
Swedish-American Tel. Co., Chicago.
Viaduct Mfg. Co., Baltimore, Md.
Vote-Berger Co., LaCrosse, Wis.
Wesco Supply Co., St. Louis, Mo.
Western Telephone Mfg. Co., Chicago, Ill.
Williams-Abbott Electric Co., Cleveland, O.
Williams Telephone & Supply Co., Cleveland, O.

Meters.
American Electric Telephone Co., Chicago, Ill.
Pocket Meter Co., Bluffton, O.

Miniature Lamps.
General Electric Co., Harrison, N. J.
Jaeger Miniature Lamp Co., New York, N. Y.

Motor Dynamos.
Holtzer-Cabot Elec. Co., Chicago, Ill.
Roth Bros. & Co., Chicago, Ill.

Moulding.
Thornton & Co., Chicago, Ill.

Name Plates.
Felsenthal & Co., G., Chicago, Ill.

Nippers and Pliers.
Klein & Sons, Mathias, Chicago, Ill.

Novelties.
Cruver Mfg. Co., Chicago, Ill.
Felsenthal & Co., G., Chicago, Ill.

Ohmmeters.
Bissell Co., F., Toledo, O.

Operator's Chairs.
Andrews Co., A. H., Chicago, Ill.
Electric Appliance Co., Chicago, Ill.
Richards Chair Panel Co., Chicago.

Pay Stations.
Baird Manufacturing Co., Chicago.
Gray Telephone Pay Station Co., Hartford, Conn.
U. S. Coin Register Co., Toledo, O.

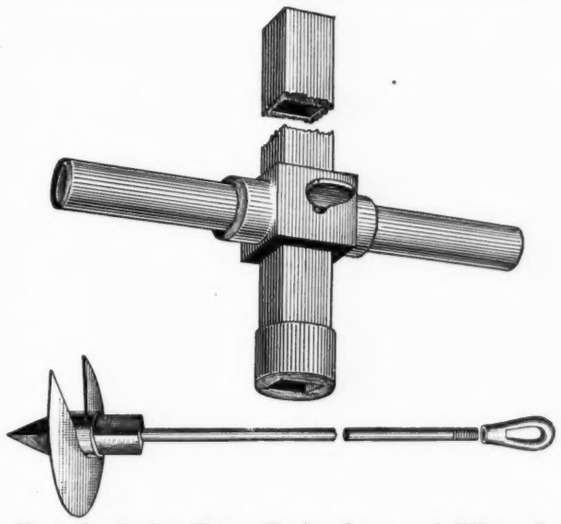
Poles, Cedar
Beidler & Co., Francis, Chicago, Ill.
Bissell Co., The F., Toledo, O.
Brooks Co., Hall L., Tomahawk, Wis.
Bruer, W. F., Kansas City, Mo.
Churchill Cedar Co., Cabinet, Idaho.
Duluth Log Company, Duluth, Minn.
Dumert Lbr. Co., C. H., Minneapolis, Minn.
Fowler & Co., John H., Chicago, Ill.
Groves, D. G. & Co., Chicago, Ill.
Hueble Co., C. J., Menominee, Mich.
Humbird Lumber Co., Sand Point, Idaho.
Lindsley Bros. Co., Spokane, Wash.
Mason, Edw. Z., Buffalo, N. Y.
Morrison Lbr. Co., J. W., Minneapolis, Minn.
Mueller Co., William, Chicago, Ill.
Naugle Pole & Tie Co., Chicago, Ill.
Pacific Coast Pole Co., Spokane, Wash.
Page & Hill Co., Minneapolis, Minn.
Partridge Lbr. Co., T. M., Minneapolis, Minn.
Pendleton & Gilkey, Minneapolis, Minn.
Pittsburg & Lake Superior Iron Co., Escanaba, Mich.
Raber & Watson, Chicago, Ill.
Sand Point Cedar Co., Sand Point, Idaho.
Sterling & Son, W. C., Monroe, Mich.
Valentine-Clark Co., Chicago, Ill.
Vogel & Co., Herman, Clark Fork, Idaho.
Whitmore, A. E., Minneapolis, Minn.
Wittenberg Cedar Co., Wittenberg, Wis.
Worcester Co., C. H., Chicago, Ill.

Poles Chestnut.
Wilson Co., J. I. M., Pittsburg, Pa.

Poles, Cypress.
Abeles & Taussig, St. Louis, Mo.
Kennett Cypress Hardwood & Lbr. Co., Kennett, Mo.

Pole Changers.
Current Elec. Co., Chicago, Ill.
Sandwich Pole Changer Co., Sandwich, Ill.
Warner Electric Co., Muncie, Ind.

Protectors, Telephone.
American Electric Fuse Co., Muskegon, Mich.
American Electric Telephone Co., Chicago, Ill.
Appleton Elec. Co., Chicago, Ill.
Central Tel. & Elec. Co., St. Louis, Mo.



Detail of the Type B Anchor and Wrench

The Rods of Stombaugh Guy Anchors

are not weakened by welds or holes for pins and rivets.

They are made of one piece. The threading of the eyes on the type B equals the strength of the rod.

Stombaugh Guy Anchors screw into the ground.

When in at the proper depth they are set. The strain can then be put on without fear of any back give. You are sure of them.

AN ANCHOR IS AS STRONG AS ITS WEAKEST PART
STOMBAUGH GUY ANCHORS HAVE NO WEAKEST PARTS
THEY ARE STRONG ALL OVER

W. N. MATTHEWS & BRO.,
MANUFACTURERS
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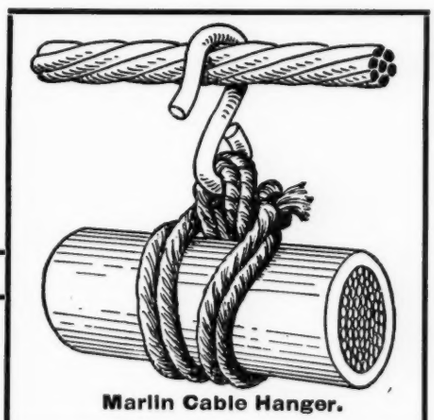
Eastern Office: 226 Taylor Bldg., Cortland St., NEW YORK

Marlin Cable Hangers



Marlin Cable Hanger.

Good Durable Hangers at Right Prices

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WE MAKE SO MANY

National Telephone Supply Co.
3925 Superior Ave. Cleveland, Ohio

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Because of absolute, lasting merit, emphasized in the most thorough tests known to the electrical world, the

ROCK ISLAND
NEW PATENT
DRY CELLS

have taken *first* rank among dry batteries. Zinc two grades heavier than that used by others, and carbon vastly superior in quality —are factors in the creation of

The Highest Voltage.

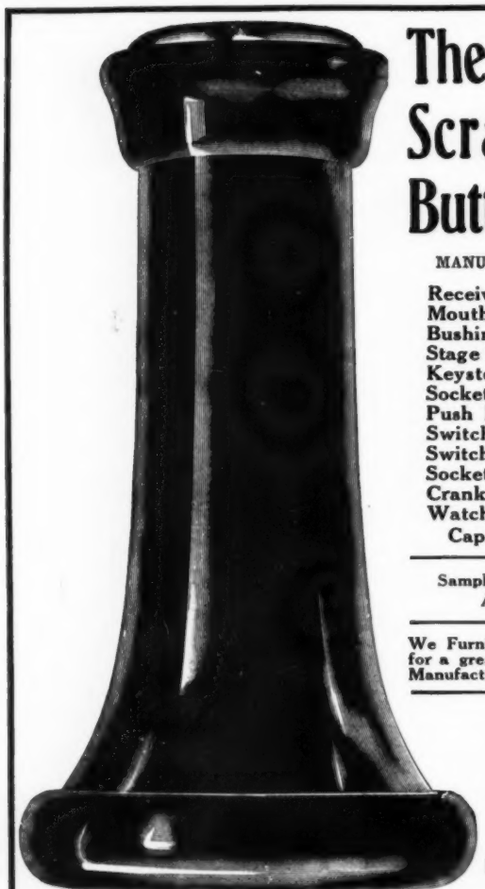
The *life* of a Rock Island New Patent Battery is 20 to 30 per cent longer than those imitations offered with the misleading label, "Just As Good." The result of competitive examinations gives us the right to PUT THAT STRONG.

Our Standard No. 8 has received *highest* endorsement from Telephone Manufacturers and Telephone Companies as *the* battery for *reliably long service.*

Standard No. 6 is the regular size.

Write Department C for prices.

ROCK ISLAND BATTERY CO.
NINTH AND SYCAMORE STREETS
CINCINNATI, O.



The Scranton Button Co.

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**Receiver Shells,
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Bushings,
Stage Plugs,
Keystone Bases,
Socket Rings,
Push Buttons,
Switch Handles,
Switch Keys,
Socket Keys,
Crank Handles, and
Watch Case Receiver Caps**

Samples Furished on Application

We Furnish Receiver Shells for a great many Telephone Manufacturers

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Automatic 3862

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Commercial Elec. Supply Co., St. Louis, Mo.
D. & W. Fuse Co., Providence, R. I.
Eureka Electric Co., Genoa, Ill.
Helios Mfg. Co., Bridesburg, Pa.
Moon Mfg. Co., Chicago, Ill.
Sterling Electric Co., Lafayette, Ind.
Williams-Abbott Electric Co., Cleveland, O.

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General Insulate & Machine Co., Brooklyn, N. Y.
Scranton Button Co., Scranton, Pa.

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Cox & Co., A. J., Chicago, Ill.

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Murdock, W. J., Chelsea, Mass.
Viaduct Mfg. Co., Baltimore, Md.

Reels, Ready Pay Out.
Nagel Electric Co., W. G., Toledo, O.

Seals, Incorporation.
Middleton & Co., J. W., Chicago, Ill.

Solder, Paste.
Climax Mfg. Co., Boston, Mass.

Solder, Self-Fluxing.
Belden Manufacturing Co., Chicago.

Specialties, Telephone.
Baird Mfg. Co., Chicago, Ill.
Cruver Mfg. Co., Chicago, Ill.
Veeder Mfg. Co., Hartford, Conn.

Staples, Insulated.
Blake Signal & Mfg. Co., Boston, Mass.

Steel, Magnet.
Burns, W. J., Chicago, Ill.
Nash & Co., Geo., Chicago, Ill.
Stevens Co., Chas. W., Chicago, Ill.

Supplies, Telephone.
American Electric Fuse Co., Muskegon, Mich.
American Electric Telephone Co., Chicago, Ill.
Andrae & Sons Co., Julius, Milwaukee, Wis.
Baird Mfg. Co., Chicago, Ill.
Bissell Co., F., Toledo, O.
Cadiz Electric Co., Cadiz, Ohio.
Central Electric Co., Chicago, Ill.
Central Tel. & Elec. Co., St. Louis, Mo.
Chase-Shawmutt Co., Newburyport, Mass.
Chicago Telephone Supply Co., Elkhart, Ind.
Commercial Elec. Sup. Co., St. Louis, Mo.
Cook, F. B., Chicago, Ill.
Dean Electric Co., Elyria, O.
Dearborn Electric Co., Chicago, Ill.
Doubleday-Hill Elec. Co., Pittsburg, Pa.
Electric Appliance Co., Chicago, Ill.
Eureka Electric Co., Genoa, Ill.
Ewing-Merkle Electric Co., St. Louis, Mo.
Farr Tel. & Con. Supply Co., Chicago, Ill.
Helios Mfg. Co., Bridesburg, Pa.
Illinois Electric Co., Chicago, Ill.
Monarch Elec. & Wire, Chicago, Ill.
Mountain State Elec. Co., Wheeling, W. Va.
Nagel Electric Co., W. G. Toledo, O.
Nebraska Elec. Co., Omaha, Neb.
North Electric Co., Cleveland, O.
Peirce Specialty Co., Chicago, Ill.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Swedish - American Telephone Co., Chicago, Ill.
Sumter Telo. Mfg. Co., Sumter, S. C.
Viaduct Mfg. Co., Baltimore, Md.
Vote-Berger Co., LaCrosse, Wis.
Wesco Supply Co., St. Louis, Mo.
Western Telo. Mfg. Co., Chicago, Ill.
Williams-Abbott Electric Co., Cleveland, O.
Williams Telo. & Supply Co., Cleveland, O.

Switchboards, Automatic Telephone.
Automatic Electric Co., Chicago, Ill.
Chicago Telephone Supply Co., Elkhart, Ind.
Globe Automatic Telo. Co., Chicago.

Switchboards, Common Battery.
American Electric Telephone Co., Chicago, Ill.
Century Tel. Construction Co., Buffalo, N. Y.
Chicago Telephone Supply Co., Elkhart, Ind.
Dean Electric Co., Elyria, O.
International Telephone Mfg. Co., Chicago, Ill.
North Electric Co., Cleveland, O.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Sumter Telo. Mfg. Co., Sumter, S. C.
Vote-Berger Co., LaCrosse, Wis.
Western Telo. Mfg. Co., Chicago, Ill.
Williams-Abbott Electric Co., Cleveland, Ohio.

Switchboards, Magneto.
Acme Elec. & Telo. Co., Chicago.
American Electric Telephone Co., Chicago, Ill.
Andrae & Sons Co., Julius, Milwaukee, Wis.
Baird Mfg. Co., Chicago, Ill.
Cadiz Electric Co., Cadiz, Ohio.
Central Tel. & Elec. Co., St. Louis, Mo.
Century Tel. Construction Co., Buffalo, N. Y.
Chicago Telephone Supply Co., Elkhart, Ind.
Dean Electric Co., Elyria, Ohio.
Electric Appliance Co., Chicago, Ill.
Eureka Electric Co., Genoa, Ill.
Farr Tel. & Con. Supply Co., Chicago, Ill.
Fisk-Newhall Telo. Mfg. Co., Chicago, Ill.
International Telephone Mfg. Co., Chicago, Ill.
Keystone Electric Telephone Co., Pittsburg, Pa.
Monarch Telephone Mfg. Co., Chicago, Ill.
North Electric Co., Cleveland, O.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Swedish-American Telephone Co., Chicago, Ill.
Sumter Telo. Mfg. Co., Sumter, S. C.
Vote-Berger Co., LaCrosse, Wis.
Wesco Supply Co., St. Louis, Mo.
Western Telephone Mfg. Co., Chicago, Ill.
Williams-Abbott Electric Co., Cleveland, O.
Williams Telo. & Supply Co., Cleveland, O.

Tape.
Morgan & Wright, Chicago.
New York Insulated Wire Co., New York, N. Y.
Standard Underground Cable Co., Pittsburg, Pa.

Telephones, Adjustable.
American Electric Telephone Co., Chicago, Ill.

Telephones, Automatic.
Automatic Electric Co., Chicago, Ill.
Chicago Telephone Supply Co., Elkhart, Ind.
Globe Automatic Telo. Co., Chicago.

Telephones, Common Battery.
American Electric Telephone Co., Chicago, Ill.
Century Tel. Construction Co., Buffalo, N. Y.
Chicago Telephone Supply Co., Elkhart, Ind.
Dean Electric Co., Elyria, O.
International Telephone Mfg. Co., Chicago, Ill.
Select Telo. Mfg. Co., Springfield, O.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Sumter Telo. Mfg. Co., Sumter, S. C.
Vote-Berger Co., LaCrosse, Wis.
Wesco Supply Co., St. Louis, Mo.
Western Telo. Mfg. Co., Chicago, Ill.
Williams-Abbott Electric Co., Cleveland, O.

Telephones, Intercommunicating.
National American Telo. Co., Chicago, Ill.

Telephones, Lock Out.
Austin & Co., M. B., Chicago, Ill.
Baird Mfg. Co., Chicago, Ill.
Johnson Elec. Mfg. Co., Chicago, Ill.
Select Telo. Mfg. Co., Springfield, O.

Telephones, Magneto.
Acme Elec. & Telo. Co., Chicago.
American Electric Telephone Co., Chicago, Ill.
Andrae & Sons Co., Julius, Milwaukee, Wis.
Baird Mfg. Co., Chicago, Ill.
Cadiz Electric Co., Cadiz, O.
Central Electric Co., Chicago, Ill.
Central Tel. & Elec. Co., St. Louis, Mo.
Century Tel. Construction Co., Buffalo, N. Y.
Chicago Telephone Supply Co., Elkhart, Ind.
Commercial Electric Supply Co., St. Louis, Mo.
Dean Electric Co., Elyria, O.
Dearborn Electric Co., Chicago, Ill.
Doubleday-Hill Elec. Co., Pittsburg, Pa.
Electric Appliance Co., Chicago, Ill.
Eureka Electric Co., Genoa, Ill.
Ewing-Merkle Electric Co., St. Louis, Mo.
Farr Telo. & Const. Supply Co., Chicago, Ill.
Fisk-Newhall Telo. Mfg. Co., Chicago, Ill.
Illinois Electric Co., Chicago, Ill.
International Telephone Mfg. Co., Chicago, Ill.
Keystone Electric Telephone Co., Pittsburg, Pa.

Monarch Telephone Mfg. Co., Chicago, Ill.
Mountain State Elec. Co., Wheeling, W. Va.
Nagel Electric Co., W. G., Toledo, O.
North Electric Co., Cleveland, O.
Select Telo. Mfg. Co., Springfield, O.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Sumter Telo. Mfg. Co., Sumter, S. C.
Swedish-American Telephone Co., Chicago, Ill.
Viaduct Mfg. Co., Baltimore, Md.
Vote-Berger Co., LaCrosse, Wis.
Wesco Supply Co., St. Louis, Mo.
Western Telephone Mfg. Co., Chicago.
Williams-Abbott Electric Co., Cleveland, O.
Williams Telephone & Supply Co., Cleveland, O.

Telephone Repairing.

Eagle Electric Co., Chicago, Ill.

Testing Clips.

Frankel Display Fixture Co., New York, N. Y.

Terminals, Cable.

Cook, F. B., Chicago, Ill.
Moon Mfg. Co., Chicago, Ill.

Time Stamps.

Baird Mfg. Co., Chicago, Ill.
Calculagraph Co., New York, N. Y.

Tools, Construction.

Bissell Co., The F., Toledo, O.
Klein & Sons, Mathias, Chicago, Ill.

Tools, Linemen's.

Klein & Sons, Mathias, Chicago, Ill.
National American Telo. Co., Chicago, Ill.
Oliver Iron & Steel Co., Pittsburg, Pa.

Universal Cord Joint.

Austin & Co., M. B., Chicago, Ill.

Voltmeters.

Illinois Electric Co., Chicago, Ill.
Leeds & Northrop Co., Philadelphia, Pa.
Pocket Meter Co., Bluffton, O.
Weston Electrical Instrument Co., Newark, N. J.

Wire, Copper.

American Electrical Works, Phillipsdale, R. I.
Monarch Elec. & Wire, Chicago, Ill.
Plume & Atwood Mfg. Co., Chicago.
Roebling & Sons Co., John A., Trenton, N. J.
Scovill Mfg. Co., Chicago, Ill.
Standard Underground Cable Co., Pittsburg, Pa.
Wire & Telo. Co. of America, Rome, N. Y.

Wire, Galvanized Iron.

Crawfordsville Wire & Nail Co., Crawfordsville, Ind.
Doubleday-Hill Elec. Co., Pittsburg, Pa.
Indiana Steel & Wire Co., Muncie, Ind.
Manhattan Electrical Supply Co., Chicago, Ill.
Monarch Elec. & Wire, Chicago, Ill.
Roebling's Sons Co., John A., Trenton, N. J.
Western Insulated Wire Co., Chicago
Wire & Telo. Co. of America, Rome, N. Y.

Wire, Magnet.

Belden Manufacturing Co., Chicago.
Runzel-Lenz Elec. Mfg. Co., Chicago.
Standard Underground & Cable Co., Pittsburg, Pa.
Wire & Telo. Co. of America, Rome, N. Y.

Wire, Strand.

Austin & Co., M. B., Chicago, Ill.
Crawfordsville Wire & Nail Co., Crawfordsville, Ind.
Monarch Elec. & Wire, Chicago, Ill.
Roebling's Sons Co., John A., Trenton, N. J.
Standard Underground & Cable Co., Pittsburg, Pa.
Wire & Telo. Co. of America, Rome, N. Y.

Wire, Telephone Switchboard.

Belden Manufacturing Co., Chicago.
National India Rubber Co., Bristol, R. I.
Runzel-Lenz Elec. Mfg. Co., Chicago.
Premier Electric Co., Chicago, Ill.
Wire & Telo. Co. of America, Rome, N. Y.

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American Wood Preserving Co., Chicago, Ill.
Carbolineum Wood Preserving Co., Milwaukee, Wis.

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Churchill Cabinet Co., Chicago, Ill.
Plymouth Novelty Mfg. Co., Plymouth, Ind.
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(STYLE 8)

Show rate of increase, so that exact calculations for the future may be made.

They likewise show how better to divide the work on the board among the operators.

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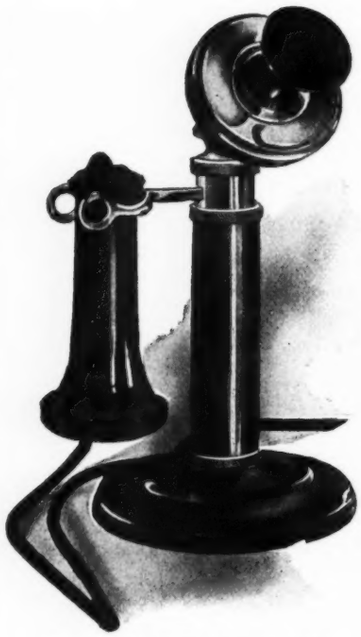

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Three Main Qualities

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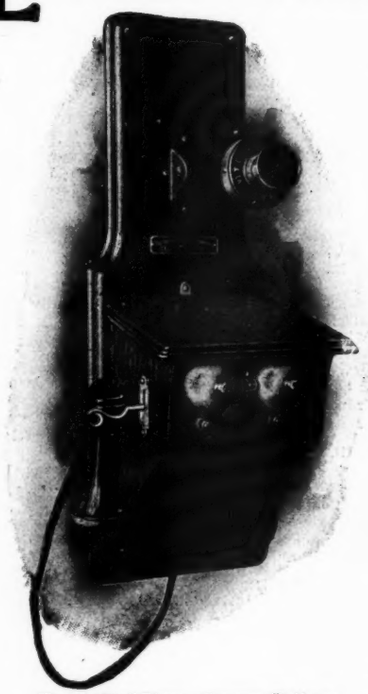

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One man sets a Wapak Anchor in twenty minutes

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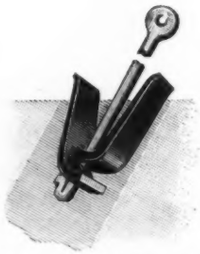

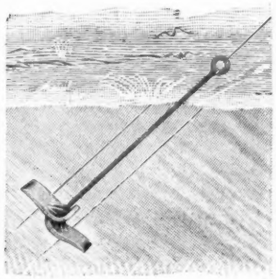

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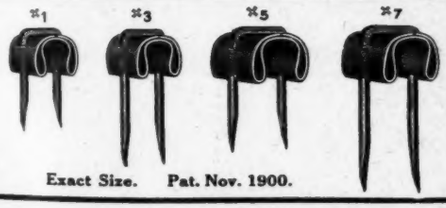

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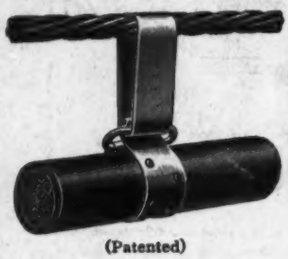

(Patented)

Metropolitan Cable Clips, Type "A"

This is the standard cable hanger for some of the largest telephone companies in the United States. It has been thoroughly tried out, and there is an increasing demand every year for this splendid cable hanger. It is strong, it is durable and will hold your cable securely under the most severe weather conditions.

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Type "B" is a modification of type "A." It appeals to the telephone Superintendent who has to contend with severe climatic conditions, and who desires to use an all zinc hanger. This clip is easy to apply, and difficult to detach. The price is right. You can no longer afford to use marline, when you can get this hanger at our new quotations. Write for samples and try them.

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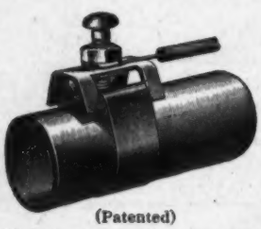

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For connecting ground wires to pipes or cables. Cheaper than a wrapped connection, as good as a soldered connection Does not injure the pipe. Can be applied quickly. Adopted by nearly all the largest telephone companies in the U. S. Place a few in the hands of your instrument men. They will like them, as well as your engineers. Write for free sample and catalogue.

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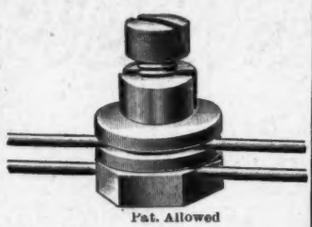
For making electrical connections of Telephone Wires, etc., which may be readily disconnected for test.
Used for PARTY LINE BRIDGES, Bridle Wire Connections and for Trunk Wire Test Connections.



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Yonkers Specialty Co., Yonkers, N.Y

H. C. Roberts Electric Supply Co., Agents

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Patented August 8, 1905

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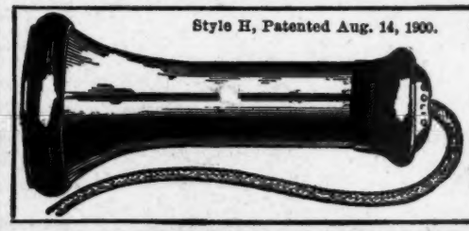

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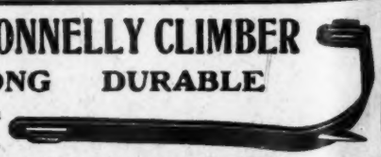

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